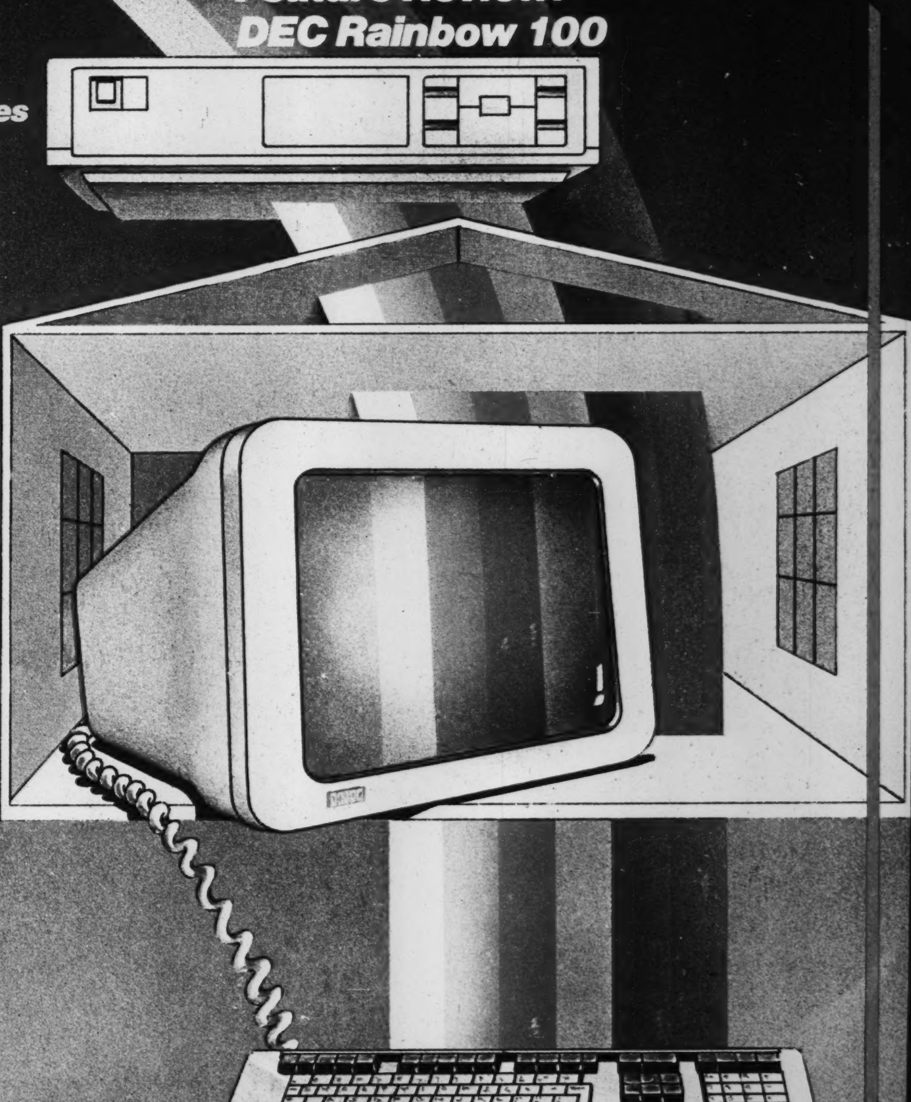
November 1982
vol 8, no 11
$2.95

Ada, Pilot, Pascal: How Best to Use Them

creative computing®

the #1 magazine of computer applications and software

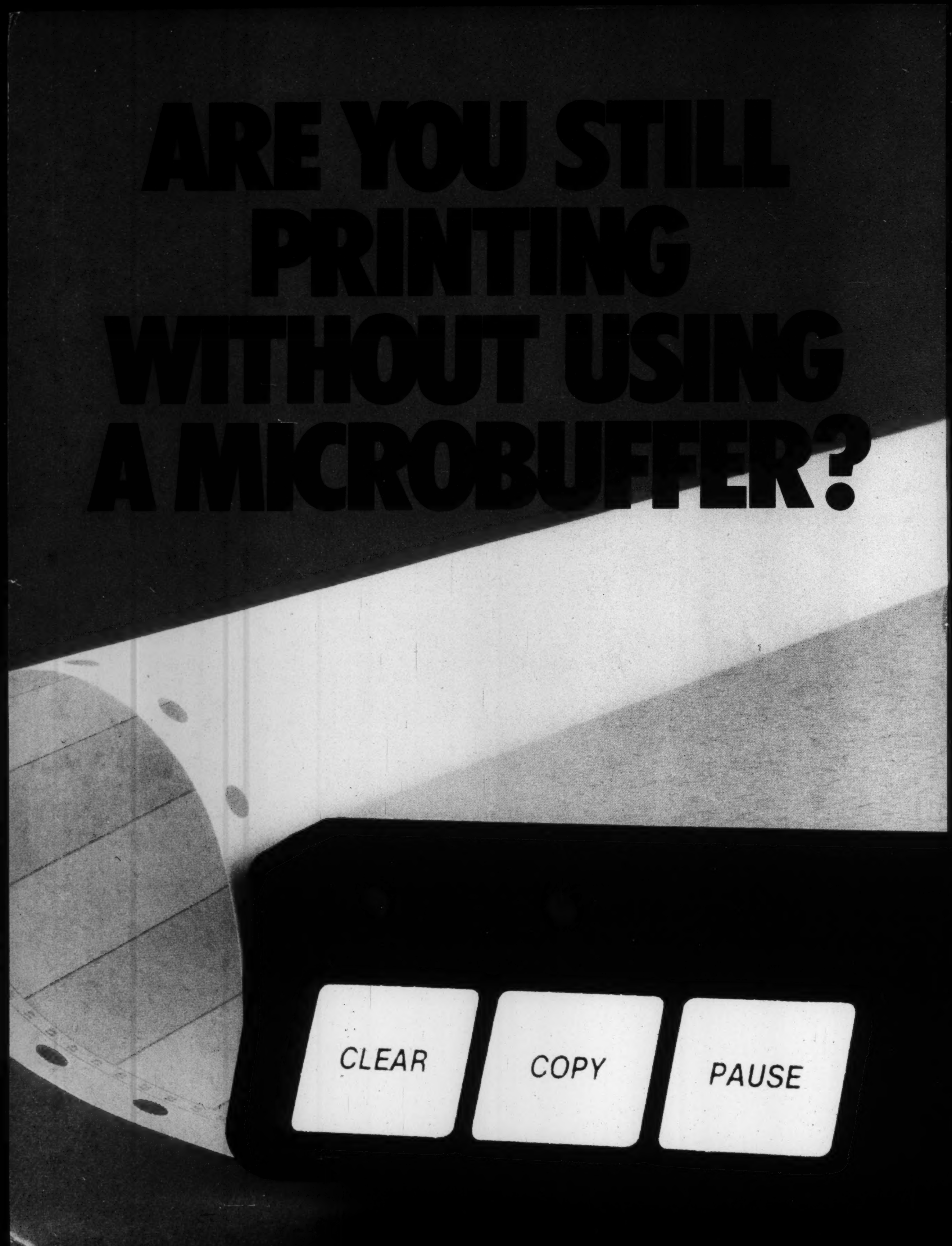
Feature Review: DEC Rainbow 100

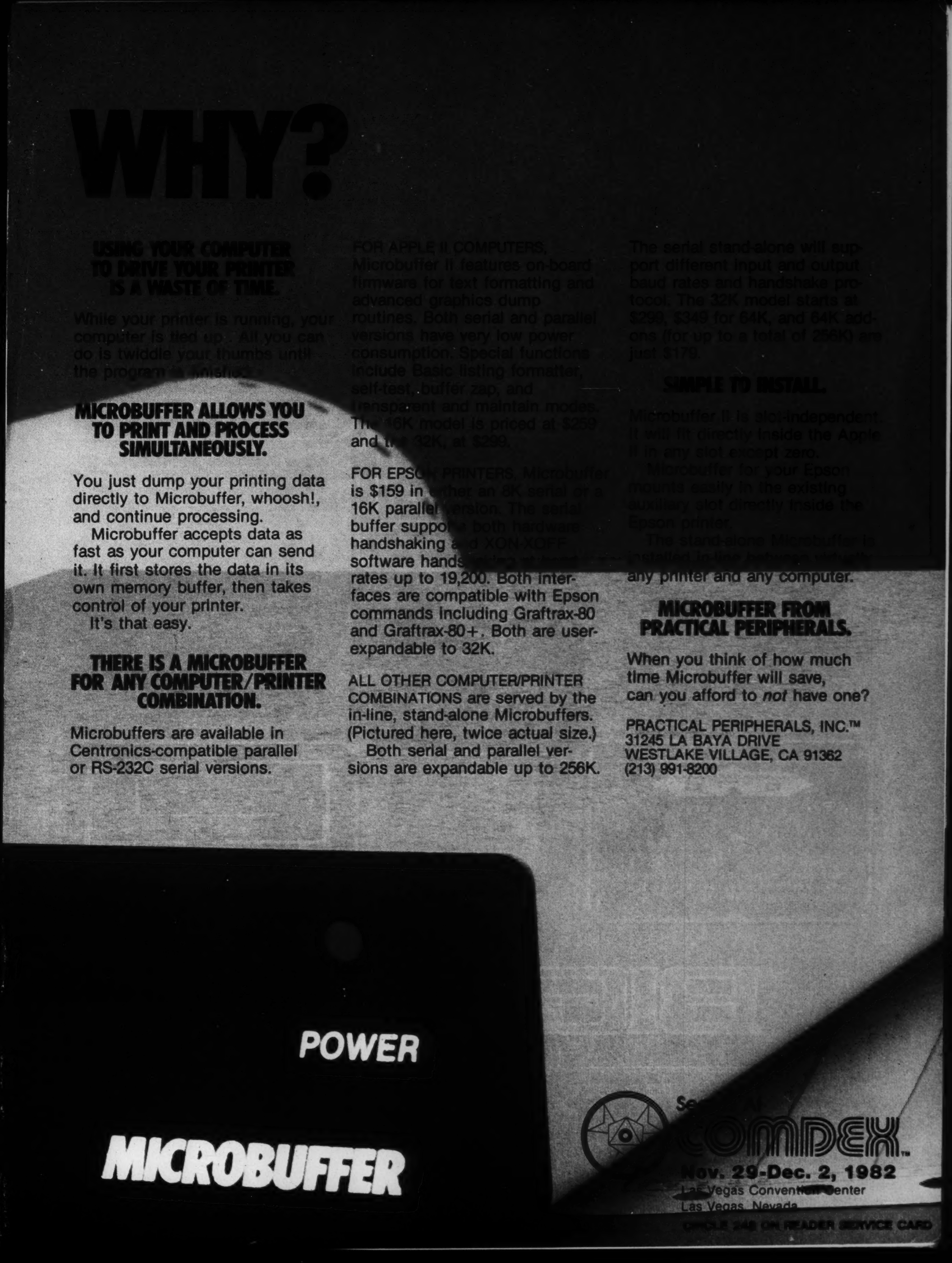


Focus on Computer Languages

Columns:
- Apple
- Atari
- IBM
- PET/VIC
- TRS-80
- Graphics
- Logo
- Books

In-depth Evaluations:
- TK! Solver
- Mathemagic
- 4 Slide Show Systems
- 14 Language packages for TRS-80 Color Computer
- Micro Dynamo
- MMS Forth
- Flight Simulator
- KDOS
- ZBasic 2.2
- JRT Pascal


ARE YOU STILL PRINTING WITHOUT USING A MICROBUFFER?
CLEAR
COPY
PAUSE



WHY?

USING YOUR COMPUTER TO DRIVE YOUR PRINTER IS A WASTE OF TIME.

While your printer is running, your computer is tied up. All you can do is twiddle your thumbs until the program is finished.

MICROBUFFER ALLOWS YOU TO PRINT AND PROCESS SIMULTANEOUSLY.

You just dump your printing data directly to Microbuffer, whoosh!, and continue processing.

Microbuffer accepts data as fast as your computer can send it. It first stores the data in its own memory buffer, then takes control of your printer.

It's that easy.

THERE IS A MICROBUFFER FOR ANY COMPUTER/PRINTER COMBINATION.

Microbuffers are available in Centronics-compatible parallel or RS-232C serial versions.

FOR APPLE II COMPUTERS, Microbuffer II features on-board firmware for text formatting and advanced graphics dump routines. Both serial and parallel versions have very low power consumption. Special functions include Basic listing formatter, self-test, buffer zap, and transparent and maintain modes. The 16K model is priced at $259 and the 32K, at $299.

FOR EPSON PRINTERS, Microbuffer is $159 in either an 8K serial or a 16K parallel version. The serial buffer supports both hardware handshaking and XON-XOFF software handshaking at baud rates up to 19,200. Both interfaces are compatible with Epson commands including Graftrax-80 and Graftrax-80+. Both are user-expandable to 32K.

ALL OTHER COMPUTER/PRINTER COMBINATIONS are served by the in-line, stand-alone Microbuffers. (Pictured here, twice actual size.)

Both serial and parallel versions are expandable up to 256K. The serial stand-alone will support different input and output baud rates and handshake protocol. The 32K model starts at $299, $349 for 64K, and 64K add-ons (for up to a total of 256K) are just $179.

SIMPLE TO INSTALL.

Microbuffer II is slot-independent. It will fit directly inside the Apple II in any slot except zero.

Microbuffer for your Epson mounts easily in the existing auxiliary slot directly inside the Epson printer.

The stand-alone Microbuffer is installed in-line between virtually any printer and any computer.

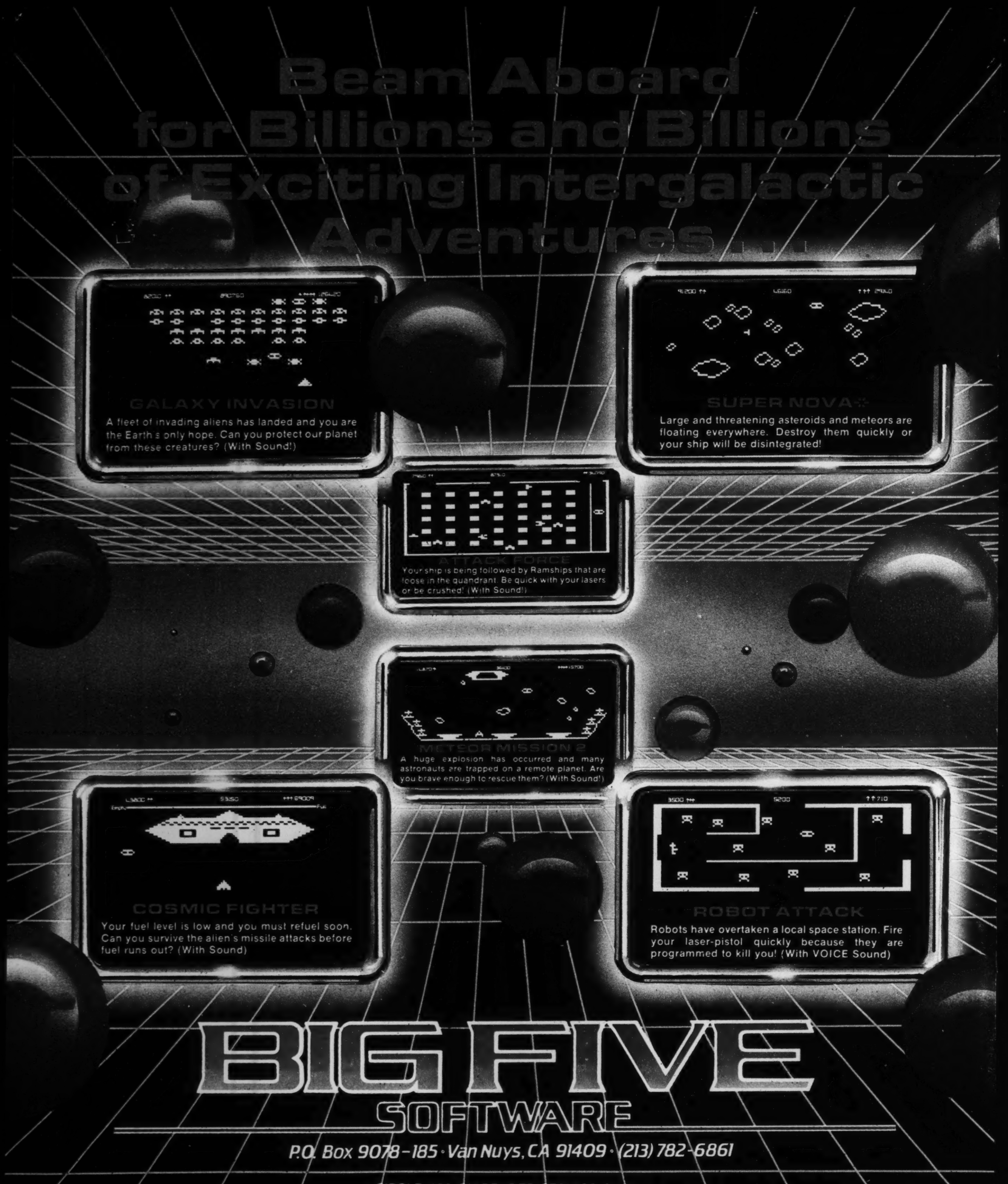
MICROBUFFER FROM PRACTICAL PERIPHERALS.

When you think of how much time Microbuffer will save, can you afford to *not* have one?

PRACTICAL PERIPHERALS, INC.™
31245 LA BAYA DRIVE
WESTLAKE VILLAGE, CA 91362
(213) 991-8200

Se
COMDEX™
Nov. 29-Dec. 2, 1982
Las Vegas Convention Center
Las Vegas, Nevada

CIRCLE 248 ON READER SERVICE CARD


Beam Aboard for Billions and Billions of Exciting Intergalactic Adventures . . .
GALAXY INVASION
SUPER NOVA✲
ATTACK FORCE
METEOR MISSION 2
COSMIC FIGHTER
ROBOT ATTACK
BIG FIVE
SOFTWARE

GALAXY INVASION
A fleet of invading aliens has landed and you are the Earth's only hope. Can you protect our planet from these creatures? (With Sound!)

SUPER NOVA✲
Large and threatening asteroids and meteors are floating everywhere. Destroy them quickly or your ship will be disintegrated!

ATTACK FORCE
Your ship is being followed by Ramships that are loose in the quandrant. Be quick with your lasers or be crushed! (With Sound!)

METEOR MISSION 2
A huge explosion has occurred and many astronauts are trapped on a remote planet. Are you brave enough to rescue them? (With Sound!)

COSMIC FIGHTER
Your fuel level is low and you must refuel soon. Can you survive the alien's missile attacks before fuel runs out? (With Sound)

ROBOT ATTACK
Robots have overtaken a local space station. Fire your laser-pistol quickly because they are programmed to kill you! (With VOICE Sound)

P.O. Box 9078-185 · Van Nuys, CA 91409 · (213) 782-6861

CIRCLE 122 ON READER SERVICE CARD

Prices per Game:		
	TRS-80 16K Lev2 Mod1/Mod3 Cassette—	$15.95
	TRS-80 32K Lev2 Mod1/Mod3 Diskette—	$19.95
	Optional Joystick for Model 1—	$39.95

10% discount for 2 items, 15% for 3 or more.
Please add $1.75 per order for postage & handling, Calif. residents add 6% sales tax.
Outside USA (except Canada) please add $3.00 per order for postage & handling.

All Games © 1980, 1981 by Bill Hogue & Jeff Konyu.
Programs are written in machine language for high quality graphics & sounc effects.
Voice & other sound effects are playable through the cassette AUX plug.
High scores are automatically saved after each game on disk versions.

Call or write for our complete catalog.
✲Audiovisual licensed from Atari.

in this issue...

evaluations & profiles

10 **DEC Rainbow 100** .... *Ahl*
The mighty mini maker enters the fray

33 **TK! Solver** .... *Ahl*
A new computing tool kit

50 **Mathemagic** .... *Murphy*

55 **PFS: Graph** .... *Ahl*
Charts and graphs from the Apple

63 **Electronic Slide Show Systems** .... *Ahl*
  64 Lotus Executive Briefing System
  70 Screen Director
  78 Slide Show
  84 Apple Flasher
  88 Poor Man's Slide Show System

93 **Micro-Dynamo** .... *Light*
A language for simulating the world

103 **ZBasic 2.2** .... *McCracken*
Finally, a compiler for everyone

109 **MMSForth** .... *Scarpelli*
Forth for the TRS-80

113 **JRT Pascal** .... *Edelson*
Pascal for CP/M Systems

120 **Programming in Pascal** .... *Greene*
An individual learning course

124 **Languages For the Color Computer** .... *Norman*
Alternatives to Basic

142 **EDTASM+** .... *Wilkins*
An editor-assembler for the Color Computer

148 **K-DOS** .... *Leemon*
An alternative to Atari DOS

152 **MON+** .... *Ahl*
Enhance your Apple monitor

154 **Casino Games For The Apple** .... *Murphy*
Poker, 21, roulette, and craps

161 **Cornsoft Flight Simulator** .... *Norman*
Any landing you can walk away from is OK

166 **Gamma Hockey** .... *Schreiber & Urbanowicz*

170 **Programmer's Guides** .... *Blank*
A programmer's guide

November, 1982
Volume 8, Number 11

Creative Computing (ISSN 0 097-8140) is published monthly by Ahl Computing, Inc., a subsidiary of Ziff-Davis Publishing Company. David Ahl, President; Elizabeth B. Staples, Vice President; Selwyn Taubman, Treasurer; Bertram A. Abrams, Secretary. P.O. Box 789-M Morristown, N.J. 07960. Second Class postage paid at New York, NY 10001 and at additional mailing offices.

Copyright ©1982 by Ahl Computing, Inc. All rights reserved.

Editorial offices located at 39 East Hanover Ave., Morris Plains, NJ 07950. Phone (201) 540-0445.
Domestic Subscriptions: 12 issues $24.97; 24 issues $43.97; 36 issues $57.97. POSTMASTER: send address changes to Creative Computing, P.O. Box 5214, Boulder, CO 80321. Call 800-631-8112 toll-free (in New Jersey call 201-540-0445) to order a subscription.

articles

128 **Tron** .... *Coffey*
The graphics of tomorrow

181 **Pilot Tutorial** .... *Smith*
First in a series

185 **Logo Ideas** .... *Lawler*
Advice to a teacher

186 **The Countess And the Computer** .... *Gilpin*
An Ada tutorial

applications & software

194 **The Pascal Directory In Depth** .... *Page*
And Pascal sytle in brief

202 **Towers of Hanoi** .... *Rudeen*
A lesson in recursive Basic

207 **Programming Data Structures** .... *Mitchell*
How to find it

218 **Making Every Vote Count** .... *Parr*
Tallying the single transferable vote

234 **Using Step Functions In Microsoft Basic** .... *Smith*

238 **INTBASIC Lives** .... *Hubbard*
Moving and using INTBASIC

242 **A Paddle Control For The Color Computer** .... *Ahl*
Build it yourself

249 **Computer Art For The Tektronix 4052** .... *Jacobson*

departments

6 **Input/Output** .... *Readers*

8 **Notices** .... *Fee*

254 **The Graph Paper** .... *Lubar*
Part Five: ROM routines

260 **New Products** .... *Hecht*

266 **Apple Cart** .... *Trainor*
Epson graphics accessories

276 **Outpost: Atari** .... *Anderson*
Telecommunications and games

282 **The Other Side** .... *Kewney*
Computing in Britain

284 **IBM Images** .... *Fastie*
Languages, new products, service and EasyWriter

294 **Personal Electronic Transactions** .... *Yob*
Languages and games

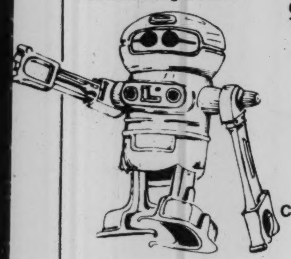
306 **TRS-80 Strings** .... *Gray*
Word processing and money management

316 **Book Reviews** .... *Gray, et al*

330 **Index to Advertisers** ....

staff

Editor-in-Chief	**David H. Ahl**
Editor	**Elizabeth B. Staples**
Managing Editor	**Peter Fee**
Technical Editor	**Michael Coffey**
Associate Editor	**John Anderson**
Contributing Editors	**Dale Archibald** **Charles Carpenter** **Thomas W. Dwyer** **Will Fastie** **Stephen B. Gray** **Glenn Hart** **David Lubar** **Guy Kewney** **Stephen Kimmel** **Ted Nelson** **Harold Novick** **Peter Payack** **David Small** **Alvin Toffler** **C. Barry Townsend** **Gregory Yob** **Karl Zinn**
Editorial Assistants	**Andrew Brill** **Karyn Hecht**
Secretary	**Elizabeth Magin**
Production Coordinator	**Christina L. Erickson**
Art Director	**Susan Gendzwil**
Assistant Art Director	**Chris DeMilia**
Artists	**Diana Negri Rudio** **Candace Figueroa** **Yukiko Sakai** **Eugene Bicknell**
Typesetters	**Karen K.Brown** **Renea C. Cole**
Advertising Director	**Jeff Weiner**
Creative Computing Press	**Laura Conboy** **Claudette Moore**
Software Development	**Kerry Shetline** **Eric F. Wolcott** **Owen Linzmayer** **Neil Radick** **Chris Vogeli**
Software Production	**Bill Rogalsky** **Nick Ninni** **Mary Ellen Mendl** **Mark Levitt**
Operations Manager	**William L. Baumann**
Comptroller	**Patricia Kennelly**
Accounting	**Jennifer H. Shaler**
Bookkeeping	**Ethel Fisher**
Retail Marketing	**Jennifer Burr** **Laura Gibbons**
Fulfillment	**Frances Miskovich** **Rosemary Bender** **Linda Blank** **Pat Champion** **Susan DeMark** **Moira Fenton** **Elsie Graff** **Gail Harris** **Linda McCatharn** **Bridget Maher** **Joanne Sapio** **Carol Vita** **Barbara Werry** **Jim Zecchin**
Shipping & Receiving	**Ronald Antonaccio** **Mark Archambault** **Bill Thomas** **Scott McLeod** **Mike Gribbon**



advertising sales

Advertising Director
Jeff Weiner
Creative Computing
Ziff-Davis Publishing Company
One Park Avenue
New York, NY 10016
(212) 725-7957

Advertising Coordinator
Ruth Darling
Creative Computing
Ziff-Davis Publishing Company
One Park Ave.
New York, NY 10016
(212) 725-3446

Northern California, Northwest
Jules E. Thompson, Inc.
1290 Howard Ave., Suite 303
Burlingame, CA 94010
(415) 348-8222
From Colorado (303) 595-9299

Southern California, Southwest
Jules E. Thompson, Inc.
2560 Via Tejon
Palos Verdes Estates, CA 90274
(213) 378-8361

New England
CEL Associates, Inc.
27 Adams Street
Braintree, MA 02184
(617) 848-9306

Midwest
The Pattis Group
4761 W. Touhy Ave.
Lincolnwood, IL 60646
(312) 679-1100

Mid-Atlantic
Larry Levine
Ziff-Davis Publishing Company
One Park Ave.
New York, NY 10016
(212) 725-7668

Southeast
Browning Publications
P.O. Box 81306
Atlanta, GA 30366
(404) 455-3430

Canada
The Pattis Group
1623 Yonge St.
Toronto, Ontario M4T 241
(416) 482-6288

microform

Creative Computing is available on permanent record microfilm. For complete information contact University Microfilms International, Dept. F.A. 300 North Zeeb Road, Ann Arbor, MI 48106, or 18 Bedford Road, London WC1R 4EJ. England, and Micro Photo Division of Bell & Howell Company, Old Mansfield Road, Wooster, OH 44691.

where to send it

All **editorial material**, including article submissions, press releases, and products for evaluation should be sent to:

Creative Computing
39 E. Hanover Ave.
Morris Plains, NJ 07950

Correspondence regarding other Creative Computing products and publications should also be sent to the Morris Plains address.

Correspondence related to **advertising**, including ad copy, questions on billing, and requests for rates, should be sent to:

Advertising Department
Creative Computing
Ziff-Davis Publishing Co.
One Park Ave.
New York, NY 10016

Correspondence regarding **subscriptions**, including orders, changes of address, and problems should be sent to:

Creative Computing
P.O. Box 5214
Boulder, CO 80321

Your help in choosing the correct address for your correspondence is appreciated. An incorrectly addressed letter or package can take as long as several weeks to reach its proper destination.

subscriptions

All subscriptions orders and other correspondence related to subscriptions should be addressed to:

Creative Computing
P.O. Box 5214
Boulder, Colorado 80321.

Foreign subscriptions must be accompanied by payment in U.S. currency.

Subscription prices:

U.S.		**Canada**		**Foreign**	
1 year	$24.97	1 year	29.97	1 year	34.97
2 years	43.97	2 years	53.97	2 years	63.97
3 years	57.97	3 years	72.97	3 years	87.97

Airmail delivery on foreign subscriptions is available for a one-year period only at **$75.00** additional for mail to Asia and Australia, and **$50.00** additional for all other foreign.

Subscribers in the United Kingdom may send payment in sterling to:

Hazel Gordon
27 Andrew Close
Stoke Golding
Nuneaton, CV13 6EL

Please allow at least eight weeks for change of address. Include old address as well as new—enclosing if possible an address label from a recent issue.

attention authors

Creative Computing will not be responsible for the return of unsolicited manuscripts, cassettes, floppy disks, program listings, etc. not submitted with a self-addressed, stamped envelope.

winchester disc
corona
Starfire 5

To Do It Right.

To make a Winchester disk for just Apple®II.

That's how we set out to design our hard disk for the Apple®II. To understand the needs of serious users and programmers, and to correct the errors of our predecessors.

You want user-friendliness. So we wrote hard disk versions of Apple DOS, CP/M® and Pascal that are highly user-friendly and loaded with useful features.

- ☐ Auto-boot hard disk
- ☐ Menu-driven utilities
- ☐ Single-keystroke program execution in DOS
- ☐ Disk search with wild cards, and many more

You want flexibility. So we made every feature variable.

- ☐ From 1 to 16 operating systems on each disk
- ☐ Operating system spaces grow as needed
- ☐ Slot independence
- ☐ Variable size volumes (to 400K in DOS)
- ☐ Mountable and unmountable volumes (even in CP/M)
- ☐ Custom DOS allowed

You want reliability. We use Seagate drives only. And Corona's unique data protection technology.

- ☐ DataGuard™ 32-bit error correction code
- ☐ FailSafe™ read-after-write and automatic bad-sector reallocation
- ☐ 2-level impact-protection packaging

You want low-cost backup. So we wrote backup utilities that make floppy backup convenient.

- ☐ File compacting to reduce the number of floppies
- ☐ Volume selective backup in all operating systems
- ☐ Date selective backup in Pascal
- ☐ Automatic diskette sequencing to ease floppy handling

You want compatibility. We maximize compatibility with existing software and peripheral cards.

- ☐ 9K interface card leaves main memory untouched
- ☐ Interrupts are allowed
- ☐ Boot protected floppies from slot 6 without removing hard disk
- ☐ Automatic slot/drive to hard disk remapping

And you want support. We do that right too.

- ☐ Hardware depot service in every region
- ☐ Programmer's guides at each level
- ☐ Software theft-protection on the hard disk

Compare the features that matter to you. And visit our local dealer or distributor for a demonstration. You'll see the difference specialization makes.

Corona Starfire™— The Winchester Disk for Apple II

$2495 / 5 MB $2995 / 10 MB

(All software included. Pascal not needed for CP/M.)

corona™

The Third Generation Microcomputer Company

CIRCLE 155 ON READER SERVICE CARD

31364 Via Colinas Section 110 Westlake Village CA 91361 (213) 706-1505

Apple is a registered trademark of Apple Computer, Inc. CP/M is a registered trademark of Digital Research, Inc. Corona, Starfire, DataGuard, FailSafe are trademarks of Corona Data Systems, Inc.

tput...input/output...inpu

Not So, Good

Dear Editor:

After reading Phillip Good's review of the Atari Word Processors in the June issue of *Creative Computing* I'm sure that many Atari owners started to gnash and wail. Take heart, folks, it's not as bad as Mr. Good implies.

Now I don't know about the *Letter Perfect* or *Text Wizard* word processors, but I do know about Atari's, because I bought one a day ago in spite of his review.

In his review he makes several mistakes: You *can* use a Centronics 739 or the new Smith-Corona TP-1 (which I'm sure Smith-Corona considers to be letter quality) Printer. He also implies that the tutorials are hopeless. Gosh, how did I learn to use it in about two hours from those hopeless tutorials? Also he says there is no back-up. Maybe they just made a mistake when one was included in my package.

Now I'm no expert. I haven't reviewed 70 zillion word processors as Mr. Good has, but it appears to me that your like of one word processor over another is akin to taste in clothes or interior decoration. There is certainly no accounting for taste.

My advice to those poor Atari owners who want word processing would be as follows: Get it. If you're like me and love to write (or must write in your job) and can't type well (or type superbly), get it. If you just started using computers, the documentation, taped lessons, and exercises with the Atari software will help immensely.

I warn you that I'm from Oklahoma, don't drive a Ferrari and can only afford beer most of the time. My house is modest and so is my expertise, and I can't afford $15,000 for a top of the line word processor, but I can say, positively, that the *Atari Word Processor* (even with its limitations) is a joy to use.

James Forrest Dearner Jr.
2405 N.W. 17th
Oklahoma City, OK 73107

It has always been the policy of Creative Computing to encourage reviewers to make judgments and express opinions about the products they evaluate. We also encourage them to put their opinions in context so readers will know from what point of view the judgments are made. Indeed, taste in word processors varies widely among computer users, and Mr. Good apparently has quite different taste from some of our other readers.—EBS

Let's Get Normal

Dear Editor:

In the April 1982 *Creative Computing* (Page 176) Marvin Weingast suggests an interesting method for approximating a normal distribution. Unfortunately his program does not do what he describes.

He says, for example, that 12.35% of the time X = 1.5*(A+B-1) where A and B are uniformly distributed random variables which vary from 0 to 1. But in the program line 50 he uses A to determine the times when this formula should be used. Thus, to get to X = 1.5*(A+B-1) A must be between .8765 and 1. B still varies between 0 and 1. The resulting distribution is quite different from that intended.

The variable used for the test must be independent of the values used in the functions.

To correct the program:

In Line 30 Add D=RND(1)

Change lines 40 and 50 to read

```
40 IF D<.8765 THEN X=2*(A+B+C-1.5)
50 IF D=>.8765 THEN X= 1.5*(A+B-1)
```

J.K. Quermann
1431 Plowman Ave.
Dallas, TX 75203

Mr. Quermann is correct, and the minor change he suggests is all that is needed, although as you can see from the curve in the article this error had little effect.

By the way, I received a few calls from readers who apparently empirically modified the equations in order to simulate different weapon firing characteristics or operator skill levels in various games.—M. Weingast

New Line Up

Dear Editor:

When running the Mu-Torere program for the Apple II (August 1982) by Sandy Greenfarb, I found that the numbers and the squares on the video display did not line up, making it somewhat confusing to play the game.

By changing line 2080 from:

```
IF I  < >  0 THEN VTAB 6: HTAB 5+3*I
```

to

```
IF I  < >  0 THEN VTAB 6: HTAB 6+2*I
```

It is an otherwise enjoyable program to use. Thank you, Sandy!

Herbert J. Lango
PSC 1 Box 1179
Brooks A.F.B., TX 78235

Tweeter Beater

Dear Editor:

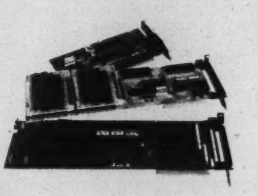
I really enjoyed the joystick article in the August '82 issue of *Creative Computing*. It is this kind of exhaustive reporting that is of true benefit to your readers.

The Happ Hi-Fi Adapter certainly sounds like a worthwhile solution to the Apple "squeeker-speaker" problem. As is so

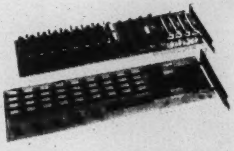
First, the IBM Personal Computer,
The Next Step . . .
Tecmar

The TECMAR Expansion series is the first and only, complete line of expansion options available for the IBM Personal Computer.

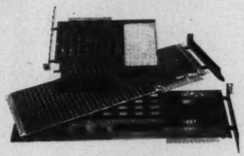
Now totaling over twenty-five separate options, the TECMAR series gives you the broadest range of expansion available for your IBM Personal Computer.



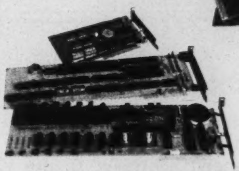
SYSTEM EXPANSION with a complete Expansion Chassis providing six additional system slots, a separate power supply and styling that complements the IBM system.



MEMORY EXPANSION in 64K 128K, 192K and 256K Byte increments of Dynamic RAM with parity. 32K Bytes of Static RAM, 32K Bytes of CMOS RAM with battery backup, or up to 128K Bytes of Read Only Memory.



PRACTICAL EXPANSION with two Serial ports and one Parallel port on a single board, or a Time of Day calendar with battery backup, a Voice Synthesizer with vocabulary in ROM and phoneme speech generation, even a BSR X10™ device controller for lights and appliances.



DISK EXPANSION through the addition of a five or ten megabyte Winchester disk. The disk options come enclosed in the TECMAR Expansion Chassis, providing additional expansion slots as well as Winchester disk storage. This approach assures you of unmatched system expandability for nearly any application.

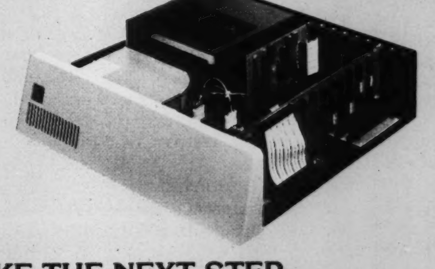
FUNCTIONAL EXPANSION is also available with TECMAR Speed Disk™ and print Spooling Software that give new functionality to memory options.

UNMATCHED EXPANSION for the serious IBM Personal Computer user through these and the many other TECMAR Expansion products available through participating COMPUTERLAND stores, and other fine computer retailers nationwide.

LABORATORY/INDUSTRIAL EXPANSION through an IEEE 488 interface, the Lab Tender with an 8 bit A/D and D/A, or the Lab Master for 12 bit A/D and D/A, a two axis Stepper Motor Controller, or the Parallel Digital-In/Digital-Out Base Board™, Video Digitization with Video VanGogh™.

DEVELOPMENT EXPANSION using an E+EEPROM programmer, Protozoa prototyping boards or a TECMAR Extender card.

NEW PRODUCTS are currently under development with many soon to be announced. At present shipping 26 unique IBM add-on products, we are still looking for needs to meet. If you have an need for a new product for the IBM Personal Computer, and would like to ask us about it, give a call on our Product Input Hotline at (216) 464-8317.



For IBM Personal Computer Expansion, TAKE THE NEXT STEP . . .

Tecmar Inc.

PERSONAL COMPUTER PRODUCTS DIVISION
23600 Mercantile Road, Cleveland, Ohio 44122
Telephone: (216) 464-7410 Telex: 241735

CIRCLE 302 ON READER SERVICE CARD

tput...input/output...inpu

often the case, there is a software alternative as well. The cassette output port can be connected to your hi-fi system or run thru a separate low-cost amp+speaker setup. This port is then "live" and all that remains is to toggle it instead of the speaker output.

In a Basic program this will usually consist of replacing an instruction that looks like:

100 POKE 49200,## with: 100 POKE 49184,##

For machine language programs the modification is to instructions like:

100 BIT #$C030 to read: 100 BIT #$C020

It isn't always practical to modify purchased software, and therefore that Happ adapter is still a quite neat device to have, especially at its reasonable price.

The CEEMAC (Visual Composition) language solves this problem by always hitting both ports and providing the user with a "soft switch" to omit toggling the Apple speaker at the user's descretion. If the cassette output port is dead (not connected), nothing is lost as the signal simply falls away.

Although not game nuts, we, at Vagabondo, find *Creative Computing* to be tops in reporting the goings on in personal computing. Keep up the good work!

Brooke W. Boering
Vagabondo Enterprises
1300 E. Algonquin -3G
Schaumburg, IL 60195

It Worked for Iacocca

Dear Editor:

The subjects of software piracy and over-priced programs have been much talked about, often together because they appear to be linked. Here's an open suggestion to software vendors. Maybe it's not directly useable as-is, but it might provide a starting point for discussions of alternatives.

The suggestion is this: when a vendor offers a new product, price it high enough to make a reasonable profit even if it doesn't sell too well. Then, if it does turn into a good seller, lower the price, and send partial rebate checks to the first customers. (One hundred—one thousand—whatever is reasonable.) Or send significant discount coupons on other software.

The plan offers these advantages:

1. People would presumably be less inclined to allow copying of their purchase if they were decreasing their chances of a rebate check.
2. People would have no reason to delay because of hopes that the price will come down. Sales might start sooner.
3. It doesn't penalize those customers the vendor needs most—the first ones.

John E. Stith
P.O. Box 7463
Colorado Springs, CO 80933-7463

tices...notices...notic

NCC '83

The 1983 National Computer Conference will be held May 16-19, 1983 at the Anaheim and Disneyland Hotel Convention Centers.

For more information, contact AFIPS, 1815 N. Lynn St., Arlington, VA 22209. (703) 558-3624.

Siggraph '83

The Tenth Annual Conference on Computer Graphics and Interactive Techniques will be held in Detroit, MI, July 25-29, 1983.

For registration information, contact the Siggraph '83 Conference Office, 111 East Wacker Dr., Chicago, IL 60601. (312) 664-6610.

The conference is sponsored by the Association for Computing Machinery's Special Interest Group on Graphics.

Heart Health Contest

The American Heart Association in conjunction with *Classroom Computer News* has announced a "Heart Health Computer Programming Contest" to solicit the development of programs on health education for eventual national distribution to schools.

Programs should be aimed at an elementary, junior high, or high school audience, and should deal with ways in which heart disease can be prevented. The best program entry has the potential to receive $1500; eleven other entries may receive $500. Programs are to be written in Basic language to run on the Apple, Atari, TRS-80, Texas Instruments or the Commodore PET microcomputers. All entries must be received by January 31, 1983. A panel of computer and education experts will act as judges and reach a decision by spring 1983.

For further information, write to "Heart Health Computer Programming Contest," American Heart Association, Greater Boston Division, 33 Fourth Ave., Needham, MA 02194, before December 1, 1982.

Corrections

We gave an incorrect address for CJM Industries in our Joystick review in the August 1982 issue (page 88). The proper address for ordering the Microstik is: CJM Industries, P.O. Box 436, Sterling, VA 22170.

The Atari customer service department phone numbers we published in the August 1982 issue were incorrect. The correct numbers are: in California, (800) 672-1404; in the rest of the U.S., (800) 538-8543.

THE LEADING EDGE IN PRINTERS

ONE GREAT LINE. ONE GREAT WARRANTY.

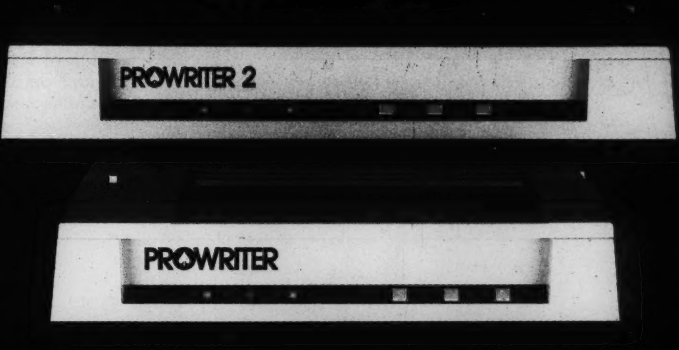
Finally, there's one full family of printers that covers every business or word processing application—all from C. Itoh, a company known for packing more product into less price; and all distributed exclusively by Leading Edge, a company known for searching out and providing that very thing. Which means that one call to one source can get you any printer, any time you need it, for any purpose. All backed by a full years' warranty from Leading Edge. (Try *that* on any other line of printers.)

THE PRO'S.

The Prowriters: business printers—and more. The "more" is a dot-matrix process with more dots. It gives you denser, correspondence quality copy (as opposed to business quality copy, which looks like a bad job of spray-painting).

Prowriter: 120 cps. 80 columns dot matrix compressable to 136. 10" carriage. Parallel or serial interface.

Prowriter 2: Same as Prowriter, except 15" carriage allows full 136 columns in normal print mode. Parallel or serial interface.



THE STAR.

The Starwriter F-10. In short (or more precisely, in a sleek 6" high, 30-pound unit), it gives you more of just about everything—except bulk and noise—than any other printer in its price range. It's a 40 cps letter-quality daisy-wheel with a bunch of built-in functions to simplify and speed up word processing. It plugs into almost any micro on the market, serial or parallel.

STARWRITER F-10

THE MASTER.

The Printmaster F-10. Does all the same good stuff as the Starwriter except, at 55 cps, the Master does it faster.

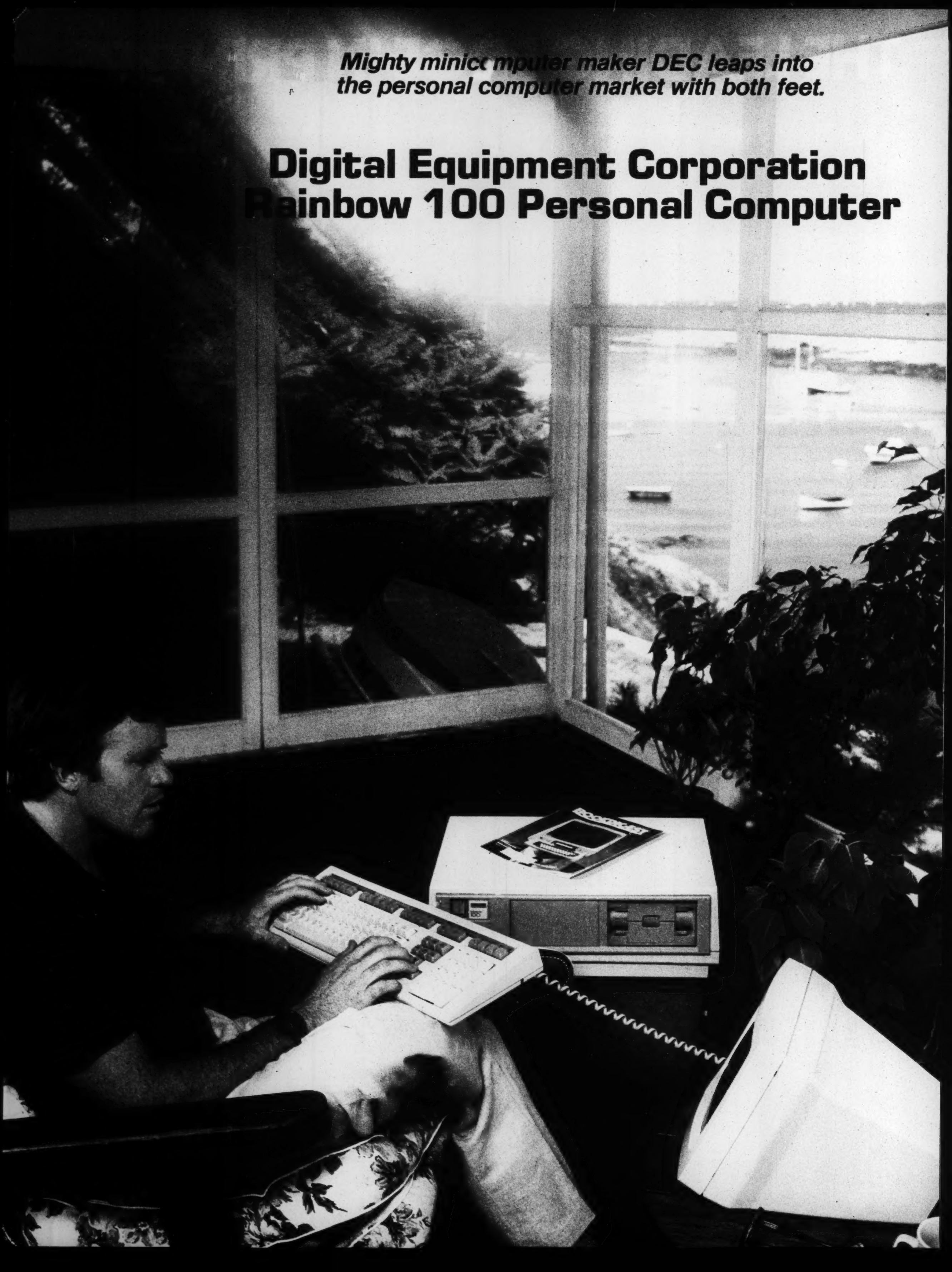
PRINTMASTER F-10

Distributed Exclusively by Leading Edge Products, Inc., 225 Turnpike Street, Canton, Massachusetts 02021.
Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.

CIRCLE 199 ON READER SERVICE CARD

Mighty minicomputer maker DEC leaps into the personal computer market with both feet.

Digital Equipment Corporation Rainbow 100 Personal Computer



creative
computing
equipment
evaluation

David H. Ahl

It was with mixed feelings that I boarded the 7:00 a.m. People Express flight to Boston. I was looking forward to returning to DEC, my employer from 1970 to 1974. I hoped to see some familiar faces and perhaps review some old memories. On the other hand, my main mission was to do an in-depth evaluation of the Rainbow 100 Personal Computer. Could I do an adequate job?

For the past few years I have been lulled into a sense of complacency by using the same few computers to meet most of my needs. In my office I have a TRS-80 Model III which I use mainly for word processing with *Electric Pencil* and financial chores with *VisiCalc*. At home I have an Apple on which I run mostly *VisiPlot*, *Executive Briefing System* and games. My kids have a TRS-80 Color Computer on which they are learning to program. At *Creative Computing* we have one or two of nearly everything else—Atari, IBM, Vic-20, Pet, Sinclair, NEC, and a bevy of S-100 CP/M systems.

However, with the exception of occasional use of an Altair 8800 (later hatched into an IMSAI) some three years ago, I have rarely touched CP/M—not that I was ever an expert on it. Hence, my trepidation facing a sophisticated new computer boasting CP/M as its operating system.

The weather in Boston did nothing to calm my stomach. Torrential rain and strong gusts of wind buffetted my rented Datsun as I drove out to the new Mt. Royal (Marlboro) facility into which DEC had moved their Terminals and Personal Computer Groups just a few months earlier.

Pete Sanborn, manager of marketing communications for the new Personal Computer Group greeted me and showed me to the demonstration room. A light, airy room as big as any three offices at Creative was the home for four lonely-looking computers. The room is normally very busy with demonstrations, but I was fortunate to be visiting during Comdex and few demonstrations were scheduled. Thus, I nearly had the place to myself.

This was a mixed blessing. For an hour or more, Pete searched in vain for someone who could show me how the system worked. "Never mind," said I. "I don't want a canned demo. Just give me a manual and let me learn it on my own."

Unfortunately, that was even more difficult. As Bob Montemerlo, product marketing manager, explained to me later, the system is still in "final development." This means that the "firmware" or the ROMs containing the system software are still being changed and modified, a process that will continue right up until volume shipments begin in October.

Rainbow 100 uses both an 8-bit Z80 and a 16-bit 8088 with shared memory, disks and I/O.

This isn't as bad as it sounds. The current system works fine and is apparently bug free, but the software engineers are trying to wring the maximum performance from it. The bad news for me, however, was that virtually no documentation currently existed, and the little that did was in extremely preliminary form.

The DEC Heritage

While Pete was searching for the "right" people, I had the opportunity to speak with Andy Knowles, vice president group manager—whatever that means! It is a bit more pretentious title than Andy had when I worked for him some 12 years ago. In those days, the whole company fit into the old woolen mill in Maynard, but that's a story for another time.

In any event, Andy has the overall responsibility for the new personal computers at DEC. When asked why DEC hadn't entered the market earlier, Andy said it was simply a matter of the technology not having "come together" to permit volume production of high quality systems with all the desired features.

Also, DEC has a history of producing as much as possible of their systems inhouse. When entering a new technology, they occasionally buy components or peripherals outside, but by the time volume production is reached, DEC is usually producing the item(s). Andy was proud that virtually all the components of the personal computers are produced inhouse, and he seemed almost apologetic that Winchester disk drives were being furnished by Seagate.

DEC is entering the personal computer market with a rather different philosophy than practically any other vendor including IBM. From a hardware standpoint, DEC makes more peripherals and components internally than any microcomputer manufacturer.

A printer rolls off a DEC assembly line every 45 seconds, a CRT every minute. Make no mistake about it, this is high volume production! Hence, DEC has little need for other hardware or peripheral manufacturers, even on an OEM basis, in order to offer complete systems. Even giant IBM was forced to purchase printers from Epson on an OEM basis and, to this day, does not offer a letter-quality printer. DEC, on the other hand, was able to offer three printers when the systems were first announced.

> ***Four DEC personal computers share the same skin, but underneath they are quite different.***

Brief digression: Although this is a review of the Rainbow 100, I occasionally speak of systems (with an "s"). In fact, DEC announced four personal computers, the Rainbow 100, Decmate II, Professional 325 and 350. I hesitate to call them a family. While they all use the same keyboard, CRT and system unit/disk housing, under the skin they are quite different. The Rainbow 100 uses two microprocessors (an 8088 and Z80), the Decmate II uses a 6120 (PDP-8 on a chip), and the Professional series is built around an F11 (PDP-11/23). Thus, while some hardware and peripherals can be shared, software is not compatible across the different machines.

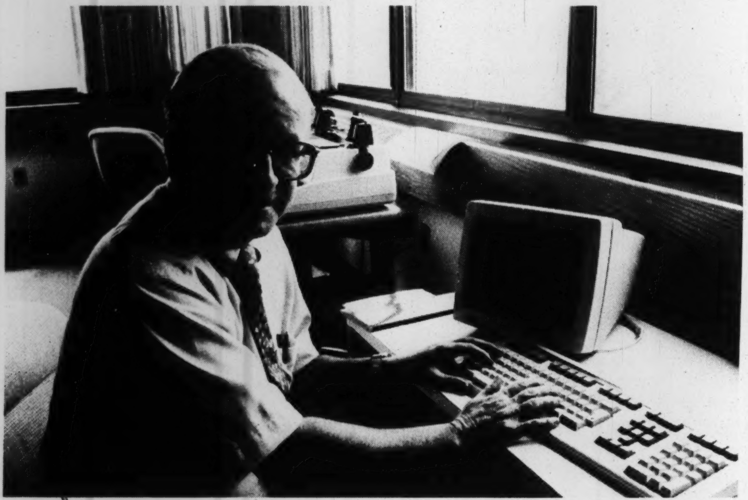


Photo 1. Andy Knowles and Rainbow 100. Sorry my Olympus was fooled by the light from the windows at the right. But the computer came out well.

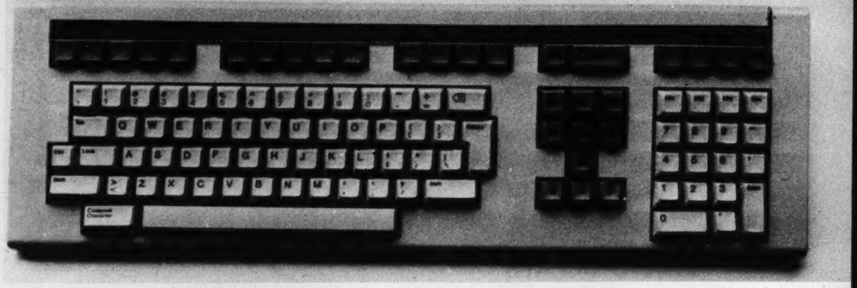


Photo 2. The low-profile keyboard is a long 21 inches because of the control keys (center) and numeric keypad (right).

Ergonomic, Low-Profile Keyboard

The first thing that impressed me upon seeing the IBM Personal Computer was the ergonomic design, particularly the low profile, separate keyboard, previously available only on upper end terminals and minicomputers. (Andy Knowles was quick to point out that DEC had been offering a detached keyboard for the past three years with the VT-100 terminal.) The IBM keyboard is nice, but in the DEC keyboard it has certainly met its match.

The low profile DEC keyboard unit measures a long 21" x 6.75". It slants from 0.6" in height at the front to 2" at the rear. The extra length is necessary to hold at the far right a numeric keypad which includes four program function keys, three punctuation marks, and an ENTER key. The program function keys may be defined in software as numeric operators, but don't have to be. In addition, between the alphabetic keyboard and the numeric keypad is a set of ten keys for cursor movement and word processing manipulation. Only the cursor control keys work with the Rainbow 100; the others are for the larger systems.

Along the top row of the keyboard are 20 function keys above which is a removable label strip beneath a hinged plexiglass cover. In total, 36 keys are firmware or software driven. In all, the keyboard has 103 keys. Their matte finish with dark-on-light legends diminishes glare and insures positive finger placement. Although the DEC promotional literature boasts that "proper arrangement of keys can help eliminate errors," I found that the "extra" key (with greater and less than symbols) located between the SHIFT and Z at the bottom left kept masquerading as the SHIFT. As a result, before correction, this paragraph, as did most of the others, started " <along . . . " I also found it curious that the "5" on the numeric keypad was not identified by a raised dot for quick finger placement.

Other than those two minor glitches, the keyboard is as near perfect as I have seen. It is exactly the right height for those who prefer the low-fatigue, palm-on-table typing style and, indeed, meets the European standard of having the home row keys 30mm above the table surface. The keys all provide excellent tactile and aural feedback (a low-volume keyclick reproduced by the self-contained speaker).

The keyboard has its own 8-bit microprocessor, 4K ROM and 256 bytes of RAM. It connects to the CRT display screen with a coiled 6' cable using telephone-type modular connectors.

Display Screen

Upon seeing the CRT display screen, I thought, "gee, that's small." However, it is not the screen that is small—it is a standard 12" diagonal CRT—but the housing. The housing measures a diminutive 11.5" high by 13.75" wide by 12.25" deep. Most other housings are 25% larger. A balancing leg on the bottom of the housing allows it to be tilted from 25 degrees back to 5 degrees forward (for use on an overhead shelf perhaps?).

Normal display mode is white characters on a black background. Yes, black. None of this light green on dark green or yellow on black. A reverse mode will

galaxy of features

A GALAXY of features makes the **LNW80** a remarkable computer. As you explore the **LNW80**, you will find the most complete, powerful, ready to run, feature-packed personal and business computer ever made into one compact solid unit.

MODEL I COMPATIBILITY – The **LNW80** is fully hardware and software compatible with the Model I. Select from a universe of hardware accessories and software – from VisiCalc® to space games, your **LNW80** will launch you into a new world of computing.

FULLY LOADED – A full payload includes an on-board single and double density disk controller for 5 ¼" and 8" single or double sided disk drives. RS232C communications port, cassette and parallel printer interfaces are standard features and ready to go. All memory is fully installed – 48K RAM, 16K graphics RAM and 12K ROM complete with Microsoft **BASIC**.

QUALITY CONSTRUCTION – Instrumentation quality construction sets **LNW80** computers apart from all the rest. Integrated into the sleek solid steel case of the **LNW80** is a professional 74-key expanded keyboard that includes a twelve key numeric keypad.

HIGH RESOLUTION GRAPHICS & COLOR – The stunning 480 × 192 resolution gives you total display control – in color or black and white. The choice of display formats is yours: 80, 64, 40 and 32 columns by 24 or 16 lines in any combination of eight colors.

PERFORMANCE – Lift-off with a 4MHz Z80A CPU for twice the performance. The **LNW80** outperforms all computers in its class.

Our down to earth price won't send you into orbit

LNW Research Corp.
2620 WALNUT Tustin, CA. 92680
(714) 641-8850 (714) 544-5744

CIRCLE 202 ON READER SERVICE CARD

Monitor and Disk drives not included

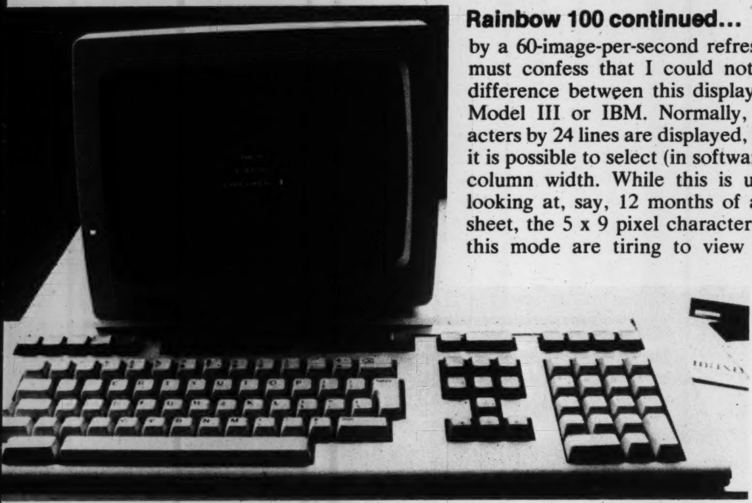


Photo 3. The screen has a matte black finish with white type.

display black on white. The surface of the screen is covered with a non-glare finish. While it needed an occasional wiping, the absence of glare was almost uncanny; I found myself wanting to touch it to reassure myself that it was really glass. However, it is highly susceptible to oily finger prints which destroy the non-glare property and are exceptionally annoying until wiped off.

The display generates 7 x 9 pixel characters including a two pixel descender for g, j, p, q, and y. Screen flicker is reduced by a 60-image-per-second refresh rate; I must confess that I could not see any difference between this display and the Model III or IBM. Normally, 80 characters by 24 lines are displayed, however, it is possible to select (in software) a 132-column width. While this is useful for looking at, say, 12 months of a spreadsheet, the 5 x 9 pixel characters used in this mode are tiring to view for long periods. Nevertheless, it is valuable to be able to preview the entire 14" line printer width.

Other software-selectable features include a split screen capability which allows portions of the 24-line screen to be scrolled separately for menu selections, messages or prompts. The *Select* word processing package (covered later) holds three lines of prompts at the top of the screen while 21 lines at the bottom hold the scrolling text.

Also available are full- and split-screen horizontal and vertical scrolling. Double-height lines and double-width characters let one add emphasis to sections of text. Or, for even more emphasis, bold, blinking, reverse-video and underline are available.

The standard Rainbow 100 includes monochrome (B&W) "character cell" video. For some extra dollars, it can be converted to a bit-map display for either monochrome or color output. This optional mode supports 16 colors simultaneously in the low resolution mode of 320 x 240 pixels or four colors from a palette of eight in the high-resolution mode of 800 x 240 pixels. Color is via an RGB output (three separate outputs for red, green and blue) rather than NTSC composite video.

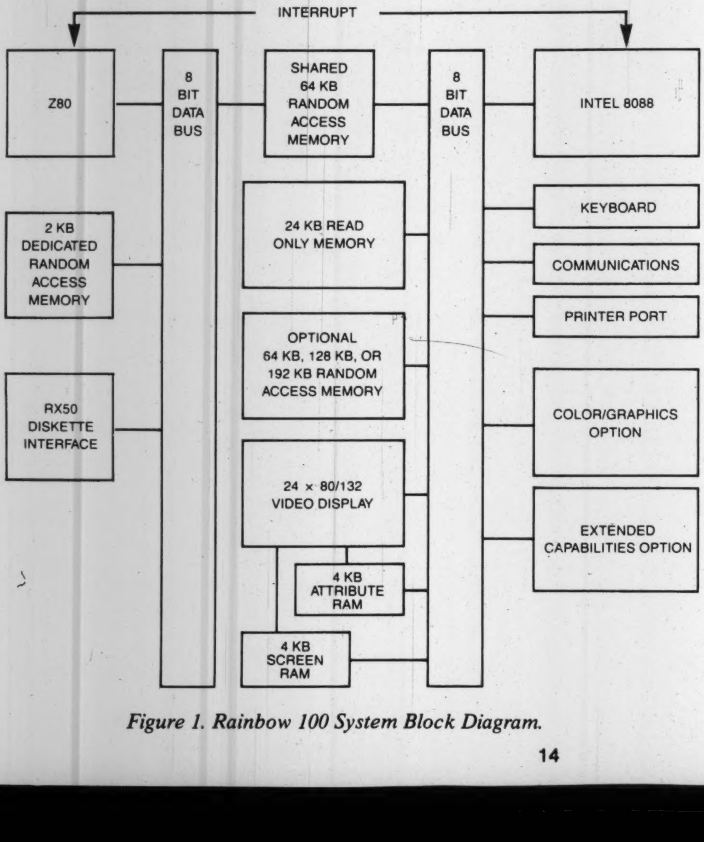


Figure 1. Rainbow 100 System Block Diagram.

System Unit and Disk Drives

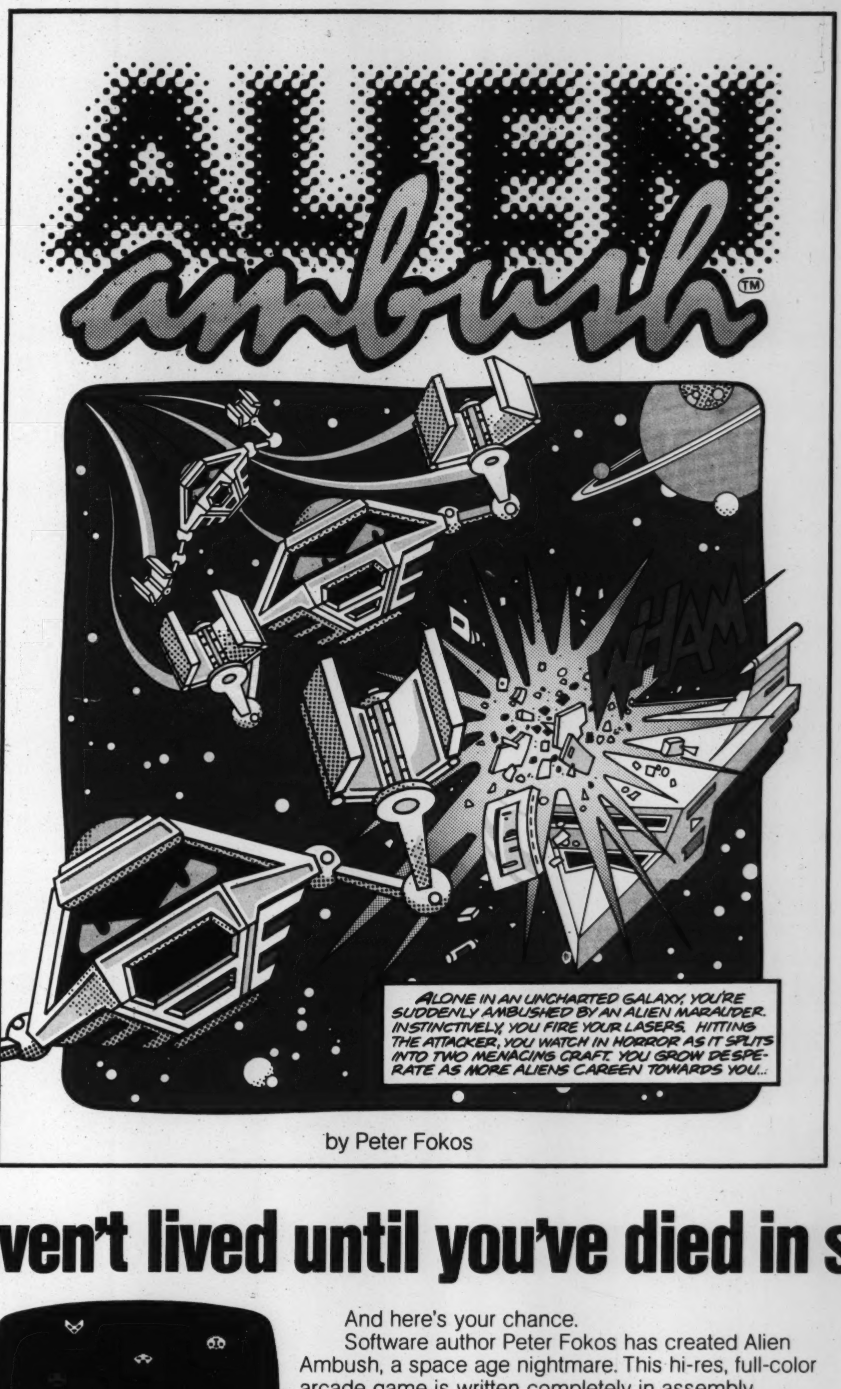
The system unit contains the microprocessors and logic circuitry, power supply, disk drives, and slots for adding optional devices. The unit is designed to be positioned either horizontally on the floor or vertically on a desk or shelf. The unit is relatively large, measuring 19" wide (shades of the rack mount days) by 15" deep by 6" high (assuming vertical mounting).

The disk drives are unique. Looking like no others, each drive accomodates two single sided 5 1/4" diskettes on a single spindle. Each disk stores 409.6K bytes. With two disks on each drive, this gives a total of 819K bytes of storage per drive, considerably more than any other currently-available small computer. Contrast this to the IBM Personal Computer, for example, which stores only 160K bytes per drive; the Rainbow stores five times as much!

Each system unit can accomodate two drives (four disks). For those concerned with specifications, here they are: single sided, 96 tracks per inch, 80 tracks used for storage, 10 sectors per track, 512 bytes per sector, 300 revolutions per minute.

The Rainbow 100 contains two microprocessors, an 8-bit Z80 and a 16-bit 8088. The two processors divide system function—disk operations are controlled by the Z80, while the display, keyboard, I/O port and options are controlled by the 8088. Both processors share 64K bytes of main memory. This may be expanded to 128 or 256K bytes. (See Figure 1).

To take advantage of the dual processors, DEC created a hybrid 8-bit CP/M 80 and 16-bit CP/M 86 operating system called CP/M 86/80. This system features a capability called "soft sense"which allows CP/M 80 and CP/M 86 application programs to run on the Rainbow 100 without operator intervention. The CP/M 86/80 operating system automatically determines if the application is an 8-bit or 16-bit program and executes the instructions with the appropriate processor and operating system.


ALIEN
ambush
TM
WHAM
ALONE IN AN UNCHARTED GALAXY, YOU'RE SUDDENLY AMBUSHED BY AN ALIEN MARAUDER. INSTINCTIVELY, YOU FIRE YOUR LASERS. HITTING THE ATTACKER, YOU WATCH IN HORROR AS IT SPLITS INTO TWO MENACING CRAFT. YOU GROW DESPERATE AS MORE ALIENS CAREEN TOWARDS YOU...

by Peter Fokos

You haven't lived until you've died in space.

SCORE HI SCORE SHIPS
03360 03380

And here's your chance.

Software author Peter Fokos has created Alien Ambush, a space age nightmare. This hi-res, full-color arcade game is written completely in assembly language to give those nasty aliens every advantage.

So if you have access to a 48K Apple* with DOS 3.3, and you're hot for some new thrills, Alien Ambush was written for you. But be warned: It just got a lot tougher to survive in space.

Available at finer computer stores everywhere. *Apple is a trademark of Apple Computer, Inc.
Distributed exclusively by Micro D, 17406 Mt. Cliffwood Circle, Fountain Valley, CA 92708 (714) 540-4781

CIRCLE 211 ON READER SERVICE CARD

Introducing Spinnaker. We make learning fun.

STORY MACHINE
CAT SAT
SPINNAKER
We make learning fun.
Have fun writing your own stories, and seeing them come to life
Ages 5-9
FACEMAKER
SPINNAKER
We make learning fun.
Have fun creating your own funny faces and seeing them come to life
Ages 4-8
SNOOPER TROOPS I
Case #1 The Granite Point Ghost by Tom Snyder
SPINNAKER
We make learning fun.
Someone is haunting the old Cable Mansion. It's up to you to find out who. But don't get caught!
Ages 10-Adult
SNOOPER TROOPS II
Case #2 The Disappearing Dolphin by Tom Snyder
TOBASCO AQUARIUM
SPINNAKER
We make learning fun.
Lily the dolphin is missing. It's up to you to find out who did it. And why.
Ages 10-Adult

© Spinnaker Software Corp., Cambridge, MA 1982

At Spinnaker Software, we make educational games that are actually fun.

Because they're fun, your children will use them. Instead of letting them collect dust in the basement.

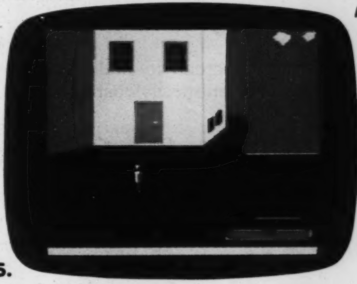
And because your children use them, they'll be learning. And after all, isn't that what educational games are all about?

Our games are educational, because you can't kid parents.

As a parent, you're probably very concerned with how much time your kids spend playing mindless video games.

Sure, they're fun. But they don't do much more than develop reflexes and hand-eye coordination. Spinnaker games are different.

All our games have true educational value. They help develop a child's learning skills. And that's something your kids can take with them wherever they go.



Our games are fun, because you can't kid kids.

Kids like Spinnaker games for the same reasons they like roller coasters, going to the beach and ice cream sundaes.

They're fun. Lots of fun. So much fun your kids will probably forget they're learning.

Our games make the computer screen come to life. With colorful graphics, animation and sound.

And they're easy to use. In fact, a lot of our games are easy enough for kids who've never even used a computer before.

How do we make our games both educational and fun?

We're glad you asked.

Educators and game programmers write our software.

Educators, because they've been in the classroom and know how children learn. And what it takes to keep their interest.

Game programmers, because they know how to have fun with computers. These programmers give our games the high resolution graphics, animation and sound that make them so entertaining.

And right now, we're introducing four new games that can be played on the most popular computers, Apple,® Atari,® and IBM.®

First, there's FACEMAKER. It's for young computer users, kids ages 4-8. FACEMAKER helps children improve memory and concentration and provides familiarity with the computer.

Another game for young users is STORY MACHINE. This game lets children ages 5-9 write their own stories and see them acted out on the screen. STORY MACHINE helps children learn to write correctly and acquaints them with the keyboard.

Our SNOOPER TROOPS™ detective series gives your child mysteries to solve. As a Snooper Trooper, your child will have to do some daring detective work, including crawling through dark houses and talking to mysterious agents.

Designed for kids ages 10 and older, SNOOPER TROOPS helps children learn to take notes, draw maps, classify information, and develops vocabulary and reasoning skills.

All four games are available in stores today.

With Spinnaker products, you can rest easy knowing your children are spending their time wisely.

So ask your retailer about the growing line of Spinnaker games.

Because one of the smartest things parents can do is help their children learn.

SPINNAKER™

We make learning fun.

Apple, IBM and Atari are registered trademarks of Apple Computer, Inc., International Business Machines Corp. and Atari, Inc. respectively.

Rainbow 100 has a built-in asynchronous/byte synchronous communications port that supports speeds up to 9600 baud with modem control. It is also equipped with a serial RS-232C printer port with programmable baud rates, parity bits, etc. for supporting a wide variety of printers as well as the three printers offered by DEC.

Optional Winchester Disk

The optional Winchester disk is housed in a separate cabinet and provides an additional five megabytes of fast-access, auxillary memory. The system consists of a 5 1/4" formatted disk.

Average access time with the Winchester Disk is 95 msec and transfer rate is 5 Mbits/sec compared to 290 msec and 250K b/s for the floppy disk system. Thus access time is three times as fast and transfer rate is 20 times as fast, a noticeable difference.

We are told that because of the sealed head/disk assembly, the drive requires no preventive maintenance or adjustments. Furthermore, the Winchester subsystem has firmware diagnostics that test and verify that all components of the system are working during power-up. These diagnostics also provide continuous error checking during normal operation.

The Rainbow 100 requires the extended communications option which contains a high-speed disk interface port to use the Winchester disk option. This communications option also contains an additional communications port.

Three Printers

DEC offers a choice of three printers with the Rainbow 100: the LA50 Personal Printer, the Letterprinter 100, and the LQP02 Letter-Quality Printer.

Each printer can accomodate a variety of papers: single sheet (such as letterhead), fanfold continuous paper, multipart forms, roll paper and labels. Each printer also contains internal diagnostic tests that are performed automatically on power-up. Also, all three have a local-mode self-test.

The LA50 is a dot-matrix printer with two print modes: text mode and enhanced print mode. In text mode it prints at 100 characters/second. The enhanced mode prints at 50 char/sec and creates a crisper, more uniform character than text mode. The seven-wire printhead allows for underlines and full descenders. The LA50 also prints double-width characters.

In addition, the LA50 prints bit-map graphics at 144 x 72 dots per inch. These dots are printed exactly as the pixels are displayed on the screen.

The LA50 can be set to three character-per-inch spacings: 10, 12 or 16.5. Also, lines-per-inch can be set to 6, 8 or 12. Maximum paper width is 10" although with the compressed character spacing, 132 characters can be printed (in 8"). Normal print width is 80 or 96 columns.

The Letterprinter 100 is a highly versatile dot matrix printer with three user-selectable or program-selectable print speeds for different quality output.

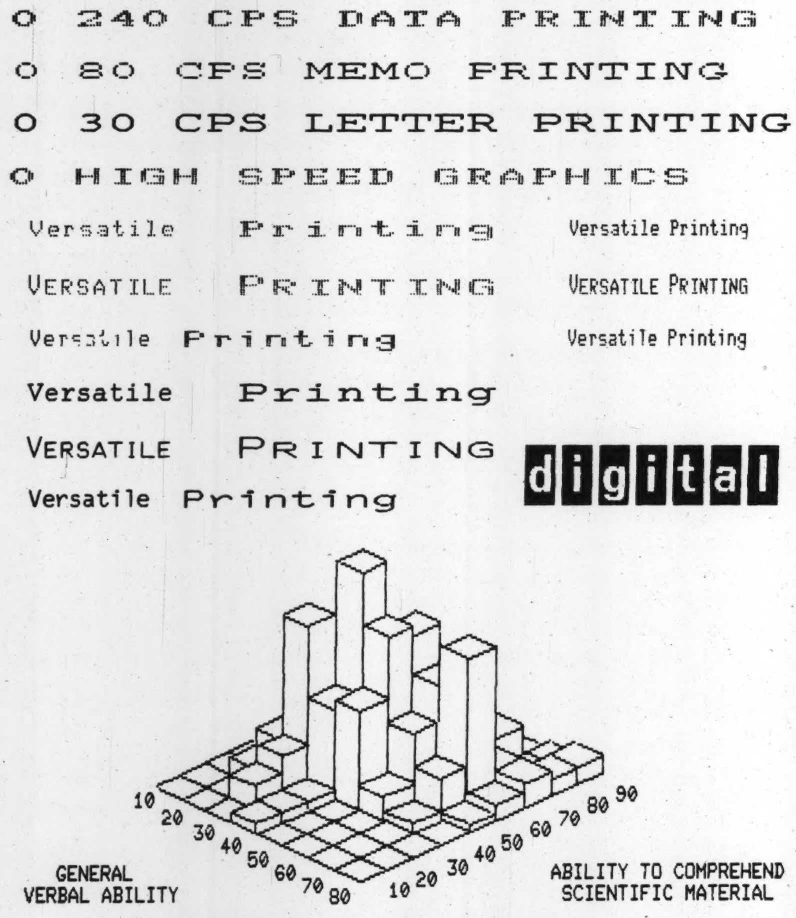
For rough drafts, internal memos or data processing, 240 characters per second produces good, clear text and numbers. The 8-character-per-second mode uses a denser dot pattern for each character and provides higher definition. In the 30-character-per-second correspondence mode, the printer overlaps two sets of dots and produces letter quality text.

The Letterprinter 100 can be placed in graphics mode at any point under software control; this allows the mixing of text and graphics on the same page. In graphics mode it prints 133 x 72 dots per inch.

For maximum creativity in designing a document, you can specify characters per inch (5, 6, 6.6, 8.25, 10, 12, 13.2, or 16.5), lines per inch (2, 3, 4, 6, 8, or 12) as well as margins, tabs and form length. These parameters can be stored in the non-volatile memory of the Letterprinter 100.

A neat feature of Letterprinter 100 is its ability to handle up to five internal character fonts. Courier-10 and Orator-10 are built into all printers. Three additional fonts can be field installed (they are on ROM chips) or you can get additional fonts on plug-in cartridges. The fonts can be changed any time during printing.

Thus by combining different fonts with expanded/compressed character widths and graphics printing—even on a single line—you can be very creative indeed. However, as I remarked in my review of Lotus *EBS*, combining too many type styles and shapes on a single sheet (or slide) does not generally lead to a visually pleasing image. On the other hand, having this exceptional versatility available on the Letterprinter 100 means that you can select just the right style for virtually any document. An example of the fonts and



O 240 CPS DATA PRINTING

O 80 CPS MEMO PRINTING

O 30 CPS LETTER PRINTING

O HIGH SPEED GRAPHICS

Versatile Printing Versatile Printing

VERSATILE PRINTING VERSATILE PRINTING

Versatile Printing Versatile Printing

Versatile Printing

VERSATILE PRINTING

Versatile Printing

digital

10
20
30
40
50
60
70
80
GENERAL VERBAL ABILITY
10
20
30
40
50
60
70
80
90
ABILITY TO COMPREHEND SCIENTIFIC MATERIAL

Figure 2. Print and graphics from Letterprinter 100.

SUPER DISCOUNT PRICES

APPLE®

SOFTWARE FOR BUSINESS AND ENTERTAINMENT

ADVENTURE INTERNATIONAL

Apple Spice (D)	$20.95
Eliminator (D)	$20.95
Planetoids "Asteroids" (D)	$17.95
Pirate's Adventure (D)	$20.95
The Count (D)	$20.95
Pyramid of Doom (D)	$20.95
Ghost Town (D)	$20.95
Savage Island I (D)	$20.95
Adventures 1, 2 & 3 (D)	$28.95
Adventures 4, 5 & 6 (D)	$28.95
Adventures 7, 8 & 9 (D)	$28.95
Adventures 10, 11 & 12 (D)	$28.95

ARTSCI

Magic Window (D)	$72.95
Magic Mailer (D)	$50.95
Magic Words (D)	$50.95

AUTOMATED SIMULATIONS

Temple of Apshai (D)	$28.95
Star Warrior (D)	$28.95
Rescue At Rigel (D)	$20.95
Datestones of Ryn (D)	$14.95
Crush Crumble & Ch. (D)	$20.95
Invasion Orion (D)	$17.95
Ricochet (D)	$14.95

AVALON HILL

Guns of Fort Defiance (D)	$17.95
B-1 Nuclear Bomber (C)	$11.95
Lords of Karma (C)	$14.95

AVANT-GARDE

Zero Gravity Pinball (D)	$20.95
HI RES Secrets (D)	$90.95
HI RES Computer Golf (D)	$20.95

BEAGLE BROS.

Dos Boss (D)	$16.95
Alpha Plot (D)	$28.95
Utility City (D)	$20.95
Tip Disk #1 (D)	$14.95

BRODERBUND SOFTWARE

Choplifter (D)	$24.95
Dueling Digits (D)	$20.95
Labyrinth (D)	$20.95
Star Blazer (D)	$22.95
Track Attack (D)	$20.95
Davids Midnight Magic (D)	$24.95
Space Quarks (D)	$20.95
Apple Panic (D)	$20.95
Alien Typhoon (D)	$17.95
Alien Rain "Galaxian" (D)	$17.95

CALIFORNIA PACIFIC

Apple-Oids (D)	$20.95
Akalabeth (D)	$24.95
Ultima (D)	$28.95

CAVALIER COMPUTER

Bug Attack (D)	$20.95
The Asteroid Field (D)	$17.95
Microwave (D)	$24.95
Star Thief (D)	$20.95

CONTINENTAL SOFTWARE

CPA#1 - General Ledger (D)	$187.95
CPA#2 - Accounts Rec. (D)	$187.95
CPA#3 - Accounts Pay. (D)	$187.95
CPA#4 - Payroll (D)	$187.95
CPA#5 - Property Mgt. (D)	$369.95
The Home Accountant (D)	$52.95
The Home Money Minder (D)	$24.95
The Mailroom (D)	$24.95

DATAMOST

Tax Beater (D)	$95.95
Real Estate Anal. Prog. (D)	$95.95
Snack Attack (D)	$20.95
County Fair (D)	$20.95
Swashbuckler (D)	$24.95
Thief (D)	$20.95

EDU-WARE

Compu-Math/Arith. Skill (D)	$36.95
Compu-Math Frac. (D)	$28.95
Compu-Math Dec. (D)	$28.95
Spelling Bee W/Read (D)	$28.95
Algebra I (D)	$28.95
The Prisoner (D)	$20.95
Rendevous (D)	$28.95

GEBELLI

Russki Duck (D)	$24.95
Horizon V (D)	$24.95
Zenith (D)	$24.95

HAYDEN SOFTWARE

Sargon II (D)	$24.95
Reversal (D)	$24.95

HIGHLANDS COMPUTER

E-Z Ledger (D)	$43.95
Oldorf's Revenge (D)	$14.95
Creature Venture (D)	$17.95
Tarturian (D)	$17.95

HOWARD SOFTWARE

Tax Preparer 1982 (D)	$114.95
Creative Financing (D)	$134.95
Calif. State Tax Preparer (D)	$55.95
NY/NJ State Tax Preparer (D)	$55.95

INFOCOM

Zork I (D)	$28.95
Zork II (D)	$28.95

INNOVATIVE DESIGN

Pool 1.5 (D)	$24.95
Trick Shot (D)	$28.95
Juggler (D)	$20.95

IUS

Profes. Easy Writer (D)	$133.95
Profes. Easy Mailer (D)	$114.95
Datadex (D)	$114.95

MICRO LAB

Data Factory 5.0 (D)	$224.95
The Tax Manager (D)	$112.95
Visifactory (D)	$55.95
Visiblend (D)	$36.95
The Merger (D)	$36.95
US Constitution Tutor (D)	$20.95

MUSE

ABM (D)	$17.95
Robot War (D)	$28.95
Castle Wolfenstein (D)	$20.95
Super Text II (D)	$107.95

ON-LINE

HI RES Mission Asteroids (D)	$14.95
HI RES Mystery House (D)	$17.95
HI RES Wiz & Princess (D)	$23.95
HI RES Ulysess (D)	$24.95
HI RES Soccer (D)	$20.95
Crossfire (D)	$20.95
Mousekattack (D)	$24.95
Threshold (D)	$28.95
Pegasus II (D)	$20.95
Frogger (D)	$24.95
Screenwriter II (D)	$97.95
The General Manager (D)	$114.95

PICCADILLY

Falcons (D)	$20.95
Star Blaster (D)	$20.95
Ribbit (D)	$20.95
Warp Destroyer (D)	$20.95

SIRIUS SOFTWARE

Gorgon (D)	$28.95
Sneakers (D)	$20.95
Epoch (D)	$24.95
Beer Run (D)	$20.95
Snake Byte (D)	$20.95
Cyclod (D)	$20.95
Bandits (D)	$24.95

SIR-TECH

Galactic Attack (D)	$20.95
Wizardry (D)	$36.95

SOF/SYS INC.

Executive Secretary (D)	$178.95
Executive Speller (D)	$55.95

SOFTWARE PUBLISHING CORP.

PFS: Report Sys. (D)	$71.95
PFS: Filing Sys. (D)	$94.95
PFS: Graph (D)	$94.95

STC

Apartment Manager (D)	$243.95

STONEWARE PRODUCTS

D.B. Master (D)	$174.95
D.B. Master Util. #1 (D)	$74.95
Micro Memo (D)	$28.95

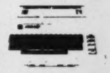
STRATEGIC SIMULATIONS

Computer Baseball (D)	$28.95
Computer Air Combat (D)	$43.95
Napoleons Campaign (D)	$43.95
Pursuit of Graft Spee (D)	$43.95

VISICORP

Visicalc 3.3 (D)	$176.95
Visifile (D)	$176.95
Visischedule (D)	$213.95
Visitrend/Plot (D)	$213.95
Visidex (D)	$176.95
Visiterm (D)	$74.95
Desktop Plan II (D)	$176.95

ATARI®



HARDWARE

★ 800 COMPUTER (16K)	$629.00
800 COMPUTER (48K)	$718.00
400 COMPUTER (16K)	$265.00
410 PROGRAM RECORDER	$74.00
810 DISK DRIVE	$429.00
★ NEC 8023A-C PRINTER	$475.00

PERCOM
D/D DISK DRV
$589.00

AXIOM GP-100 PTR	$299.95	AXIOM IMP-4 PTR	$489.95
ENTERTAINER	$66.95	32K RAM (INTEC)	$89.95
EDUCATOR	$114.95	32K RAM (MICROTEK)	$99.95
PROGRAMMER	$52.00	32K RAM (MOSAIC)	$118.95
COMMUNICATOR	$299.00	48K RAM (INTEC)	$189.95
✱ BOOKKEEPER (KIT)	$169.95	128K RAMDISK	$425.00

ATARI®

SOFTWARE FOR ENTERTAINMENT AND EDUCATION

ADVENTURE INTERNATIONAL

Adventures 1, 2 & 3 (D)	$28.95
Adventures 4, 5 & 6 (D)	$28.95
Adventures 7, 8 & 9 (D)	$28.95
Adventures 10, 11 & 12 (D)	$28.95
Star Trek 3.5 (D)	$17.95
Rear Guard (D)	$17.95
Adventures 1-12 Each (C)	$14.95
Preppie (C/D)	$20.95
War (D)	$18.95
Commbat (D)	$18.95

APX

Eastern Front 1941 (C/D)	$22.95
Extended Fig-Forth (C)	$29.95
Avalanche (C)	$16.95
Outlaw/Howitzer (C)	$16.95

ATARI INCORPORATED

Microsoft Basic (D)	$65.95
Macro Assem. & Editor (D)	$65.95
Assembler Editor (R)	$44.95
Basic Cartridge (R)	$44.95
Pac Man (R)	$32.95
Centipede (R)	$32.95
Caverns of Mars (D)	$28.95
Missile Command (R)	$26.95
Star Raiders (R)	$32.95
Asteroids (R)	$26.95
Conversational Lang. Ea. (C)	$43.95
Music Composer (R)	$30.95
Super Breakout (R)	$26.95
Computer Chess (R)	$26.95
My First Alphabet (D)	$25.50

AUTOMATED SIMULATIONS

Invasion Orion (C/D)	$17.95
Rescue At Rigel (C/D)	$20.95
Crush Crumble & Ch. (C/D)	$20.95
Temple of Apshai (C/D)	$28.95
Ricochet (C/D)	$14.95
Star Warrior (C/D)	$28.95
Datestones of Ryn (C/D)	$14.95
Dragon's Eye (D)	$20.95

AVALON HILL

Empire of Overmind (D)	$24.95
Dnieper River Line (D)	$20.95
Voyager (D)	$17.95
Galaxy (D)	$17.95
B-1 Nuclear Bomber (C)	$11.95
Lords of Karma (C)	$14.95
Guns of Fort Defiance (C)	$14.95
Computer Stocks & Bonds (D)	$15.95

BRODERBUND SOFTWARE

Apple Panic (D)	$20.95
Star Blazer (D)	$22.95
Choplifter (D)	$25.95
Davids Midnight Magic (D)	$24.95

DATA SOFT

Canyon Climber (D)	$20.95
Pacific Coast Hwy (D)	$20.95
Clowns & Balloons (D)	$20.95

EDU-WARE

Compu-Read (D)	$20.95
Compu-Math Frac. (D)	$28.95
Compu-Math Dec. (D)	$28.95
Compu-Read (C)	$14.95

INFOCOM

Zork I (D)	$28.95
Zork II (D)	$28.95
Deadline (D)	$35.95

IN-HOME SOFTWARE

Crypts of Terror (D)	$24.95
Alien Swarm (D)	$24.95
Intruder (D)	$24.95

LJK

Letter Perfect (D)	$108.95
Mail Merge/Utility (D)	$20.95
Data Perfect (D)	$78.95

ON-LINE

HI RES Wiz & Princess (D)	$23.95
HI RES Mission Asteroids (D)	$17.95
Crossfire (C/D)	$20.95
Mousekattack (D)	$24.95
Jawbreaker (C/D)	$20.95
Frogger (C/D)	$24.95
Threshold (D)	$28.95
Ultima I (D)	$28.95
Ultima II (D)	$43.95

QUALITY SOFTWARE

Ali Baba & 40 Thieves (D)	$23.95
QS Forth (D)	$58.95
Starbase Hyperion (D)	$16.95
Fastgammon (C)	$14.95

STRATEGIC SIMULATIONS

The Shattered Alliance (D)	$28.95
Tigers In The Snow (C/D)	$28.95
Battle of Shiloh (C/D)	$28.95

SYNAPSE SOFTWARE

Protector (C/D)	$20.95
Shamus (C/D)	$21.95
Nautilus (C/D)	$20.95
File Manager 800 (D)	$72.95

SYNCRO

Alien Hell (D)	$14.95
Maze of Death (D)	$14.95
Mar Tesoro (D)	$17.95

USA

3-D Supergraphics (C/D)	$28.95
Survival Adventure (C/D)	$17.95
Atari World (D)	$43.95

MISCELLANEOUS SOFTWARE

Gorf (D)	$29.95
Master Type (D)	$25.95
K-razy Shootout (R)	$35.95
Pool 1.5 (D)	$24.95
Pool 400 (R)	$29.95
Sneakers (D)	$21.95
Space Eggs (D)	$21.95
Wizard of Wor (D)	$29.95
Word Race (D)	$18.97
Visicalc (D)	$176.95

D = DISK C = CASSETTE
R = ROM (CARTRIDGE)

COSMIC COMPUTERS
UNLIMITED

THE ABOVE PRICES ARE FOR PREPAID ORDERS

WRITE FOR FREE CATALOG: INDICATE APPLE OR ATARI

ORDER LINES OPEN
MON-SAT 8 am - 9 pm

228 N. PROSPECTORS RD.
DIAMOND BAR, CA 91765

(714) 861-1265

APPLE IS A TRADEMARK OF APPLE COMPUTER, INC.
ATARI IS A TRADEMARK OF ATARI, INC.

Add $2.00 Shipping per software order. Hardware Shipping, call for cost. Calif. residents add 6½% sales tax. Cashiers Checks or Money Orders filled same day. Personal checks require 2 weeks to clear. **Master Card and Visa OK for software only, add 3% surcharge.** Include card no., expiration date and signature.

CIRCLE 156 ON READER SERVICE CARD

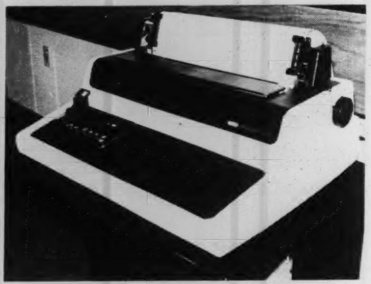


Photo 4. Letterprinter 100.

styles that can be printed under program control is shown in Figure 2.

The LQP02 is a daisywheel printer with a print speed of 32 characters per second. With a built-in 256 character buffer it has bidirectional printing capability and can operate at baud rates of up to 9600.

To produce bold characters, the LQP02 uses a technique called "shadow bolding" in which characters are struck twice as in normal bold print. But unlike normal bolding, the second strike is slightly offset from the first. This makes the bold print more visible.

Characters per inch are software selectable (10 or 12) as are lines per inch (2, 3, 4, 6 or 8). Margins, tabs and form length also can be software controlled.

Maximum print width is 13.5" on 15" paper. With an optional forms tractor, the LQP02 can handle fanfold paper.

CP/M 86/80

According to the DEC *Guide to Personal Computing*, "CP/M—Control Program for Microcomputers—is characterized as a single-task, diskette-based operating environment that is well-suited to low-cost personal computer hardware. CP/M was one of the first disk operating systems not designed for a particular computer."

"CP/M provides basic computer services. It is perhaps best known for its simple and reliable file system used with diskettes. It has been improved and rewritten over the years as faster, more reliable disk drives were introduced." New versions have also been written to take advantage of new 16-bit microprocessors.

The Guide continues, "The widespread acceptance of CP/M has resulted in numerous software vendors offering thousands of ready-to-run CP/M application programs." Very true. Every issue of *Microsystems*, a magazine devoted to CP/M, is filled with descriptions of new applications and utility software for the system.

But bear in mind, at the moment this vast library of CP/M packages cannot simply be purchased from a local computer store, popped into a Rainbow 100, and run. A large portion of the CP/M software is available only on 8" disks. Much that is on 5 1/4" disks has had subtle modifications added so that it runs on a specific system, a NorthStar for instance. As soon as Rainbow 100 systems start to be shipped in volume, there no doubt will be scores of software vendors converting existing CP/M software packages and writing new ones specifically for the Rainbow.

DEC has started a software program which will evaluate, rate and, in some cases market software from third-party vendors. The lowest category is "Digital-Tested." This means that DEC has checked all the details of the package and found it will run as specified in the documentation. It has no known "bugs" and meets DEC's criteria for installation, ease of use, and performance consistency.

The second category is "Digital-Serviced." This is the same as "Digital-Tested" but also meets the serviceability criteria set by the DEC Software Service organization. Service contracts will be offered on software in this category.

"Digital-Developed" is the seal applied to DEC's own software products, although in some cases these products have been developed by outside organizations. The following packages are in this third category.

Word Processing Program

Before describing the word processing program, it is important to "set the stage." Andy Knowles and Barry Folsom, Rainbow product manager, emphasized that the Rainbow WP package is aimed at managers and occasional users who need to prepare memos, letters, and reports. For heavier WP users, they strongly recommend the DECmate II system which runs DEC's time-tested WPS Word Processing System. That said, let's look at the *Select* WP package for the Rainbow 100.

Select Information Systems, Inc. of Kentfield, CA has been marketing a word processing system for CP/M, MP/M and CDOS systems for several years. It is a comprehensive system which requires at least two disk drives, an 80-character screen and 48K or more memory. For this review, we shall simply call it "*Select*."

Select is a menu-driven system. After loading, the main menu appears on the screen (see Figure 3). Page 6 of the manual emphasizes, "The best way to learn *Select* is to **put the manual down now!** Type "T" for Teach and take the *Select* tutorial."

That is exactly what I did. It took me about 90 minutes to work through the tutorial which combines a friendly tutorial style with plenty of hands-on practice. Each command is fully described and illustrated on the screen. An example is then presented. This is followed by a practice problem with prompting so it is nearly impossible to go wrong. Finally, a second practice problem is presented with no hints or prompting (except what would normally appear on the screen). At the end of each command, the program asks if you would like a review or if you wish to go on.

Text is created by entering Edit mode. From this mode, 21 commands can be invoked (see Figure 4). To create text, you simply select Insert and start typing. In Insert mode, only the backwards cursor key is operational; it is used for erasing. If you make a mistake, you may erase back to it and continue typing from that point. On the other hand, if you notice an error three or four lines earlier, it is generally best to finish the current sentence or paragraph, press Escape (to store your text in memory), and enter one of the correction modes.

Let's consider an example. In the paragraph above, I mistyped "correction" as "corecting." To correct this, I pressed ESC at the end of the paragraph. The message flashed on the screen:

"Justification taking place, please wait."

This process took about four seconds to justify the text and two seconds to rewrite the screen. I then positioned the cursor over the e, typed I (for insert), typed the missing letter r, and ESCAPE. Another

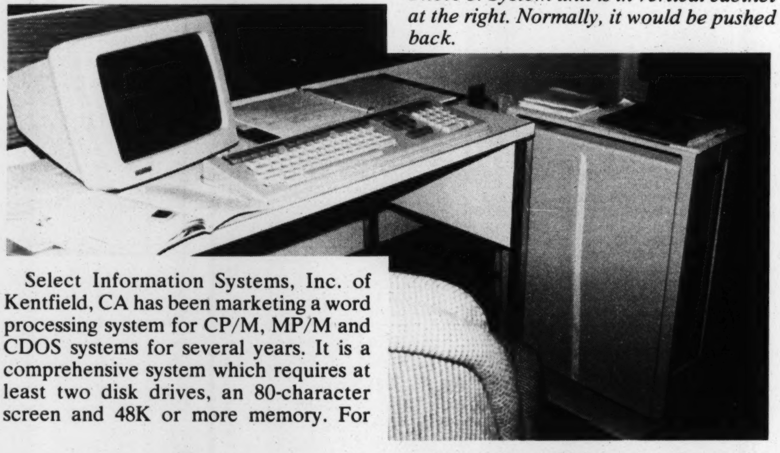


Photo 5. System unit is in vertical cabinet at the right. Normally, it would be pushed back.

The Official FROGGER™

by SEGA®

APPLE VERSION BY
OLAF LUBECK
ATARI VERSION BY
JOHN HARRIS

FROGGER runs on any 48K APPLE II with DOS 3.3 or ATARI 400/800 with 32K and a Diskdrive, 16K and cassette. Frogger is available for $34.95 at your local computer store or order directly from . . .

All orders by VISA, Mastercard, check, or COD. Add one dollar for shipping. California residents please include 6% sales tax.

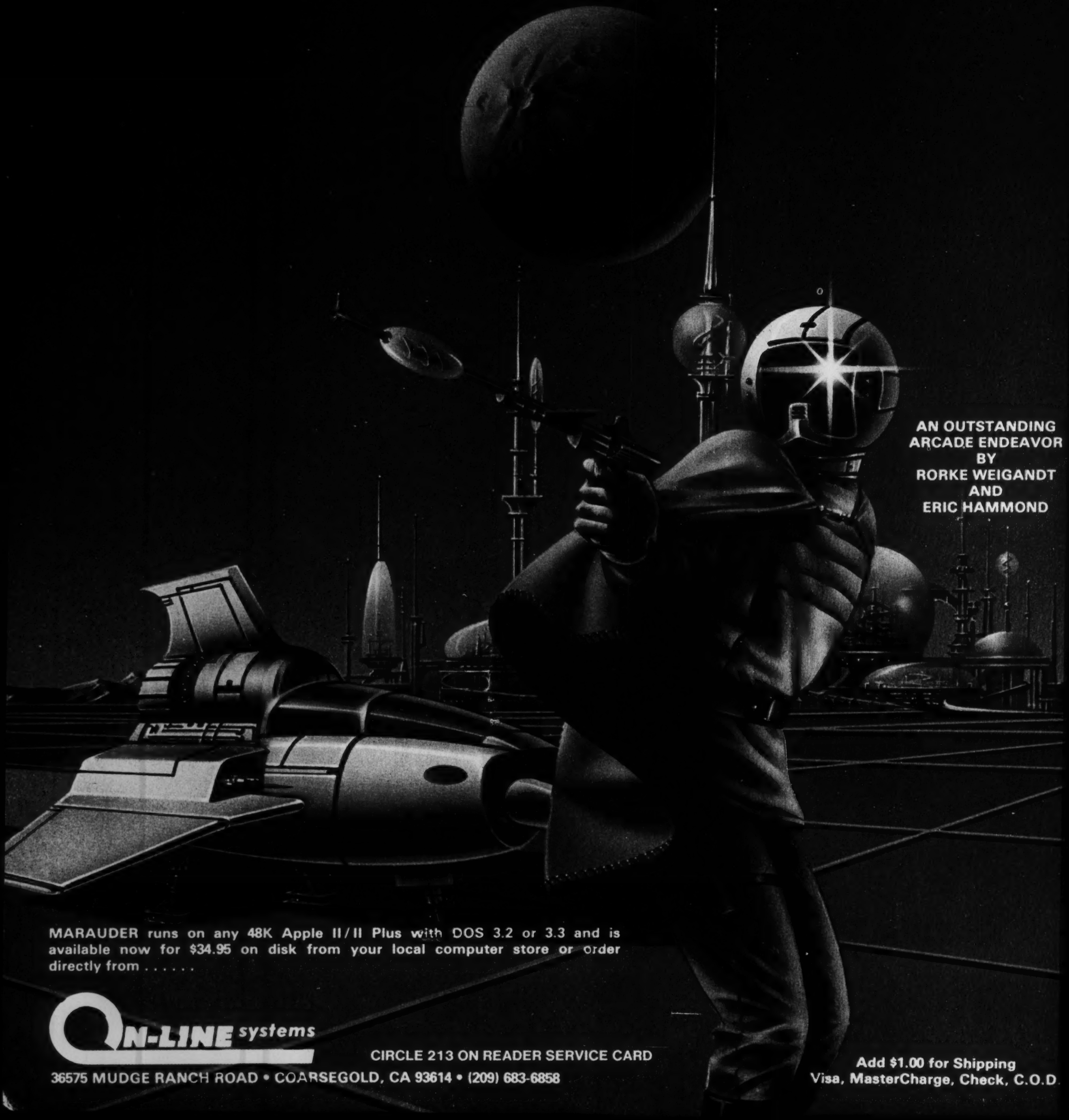
Sierra
ON-LINE INC
36575 MUDGE RANCH ROAD COARSEGOLD CA 93614
TLX 9103625025 209 683 6858
CIRCLE 238 ON READER SERVICE CARD

® and ™ designate trademarks of Sega Enterprises, Inc.

© 1981 Sega Enterprises, Inc.

The Ultimate Experience in Alien Invasion . . . .

MARAUDER



AN OUTSTANDING
ARCADE ENDEAVOR
BY
RORKE WEIGANDT
AND
ERIC HAMMOND

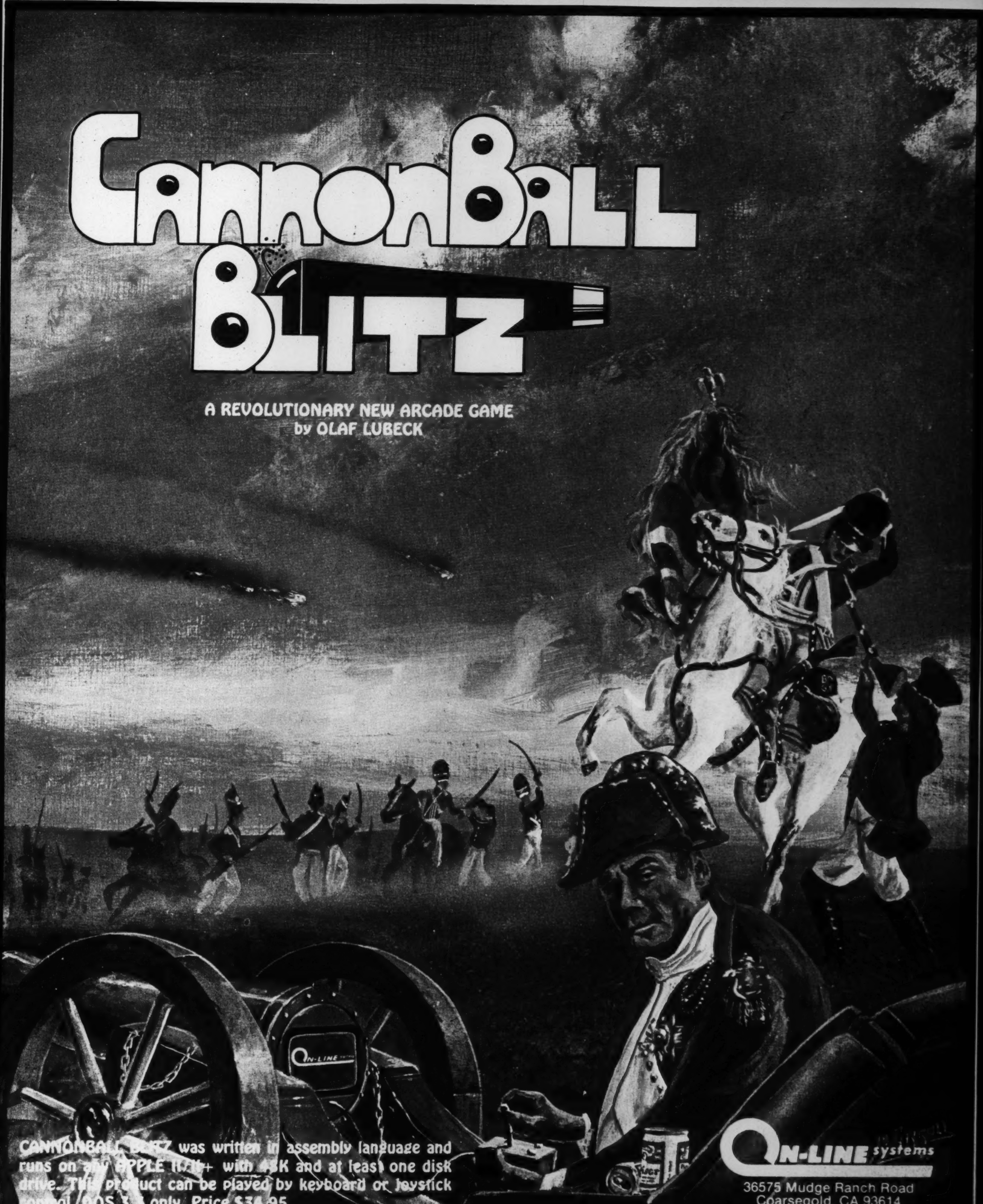
MARAUDER runs on any 48K Apple II/II Plus with DOS 3.2 or 3.3 and is available now for $34.95 on disk from your local computer store or order directly from . . . . . .

ON-LINE systems

CIRCLE 213 ON READER SERVICE CARD

36575 MUDGE RANCH ROAD • COARSEGOLD, CA 93614 • (209) 683-6858

Add $1.00 for Shipping
Visa, MasterCharge, Check, C.O.D.



CANNONBALL BLITZ

A REVOLUTIONARY NEW ARCADE GAME
by OLAF LUBECK

CANNONBALL BLITZ was written in assembly language and runs on any APPLE II/II+ with 48K and at least one disk drive. This product can be played by keyboard or joystick control. DOS 3.3 only. Price $34.95.

ON-LINE systems

36575 Mudge Ranch Road
Coarsegold, CA 93614
209-683-6858

Add $1.00 for shipping

VISA, Mastercard, C.O.D. or checks accepted

CIRCLE 313 ON READER SERVICE CARD

five-second delay to justify and rewrite the screen. I then moved the cursor over the n, typed X (for exchange), typed the correct letters (on), and ESCAPE. Since justification need not be done after an exchange operation, the software was immediately ready to proceed.

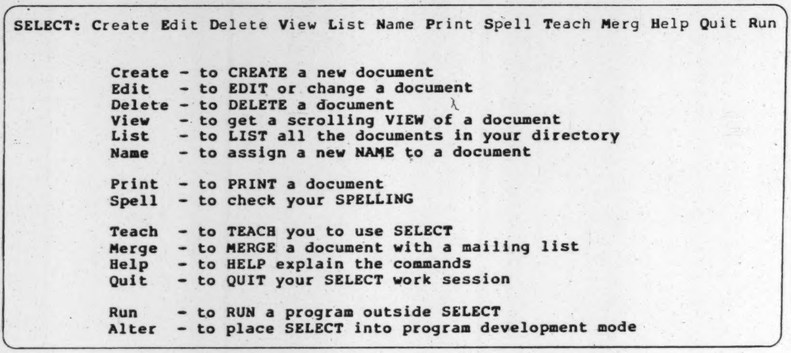
This process is, of course, quite different from that used by the memory mapped word processing systems available on most microcomputers. *Select* does not move letters, words and paragraphs around as changes are made. Rather, such movement is done only when the ESCAPE key is pressed. Personally, I found it awkward to get used to *Select* after years of using *Electric Pencil* and *Scripsit*. However, this article is testimony to my having learned it since it was written entirely in *Select* on a Rainbow 100.

Print formatting commands must be imbedded in the text. Note, I did not say "may be." On the other hand, most formatting commands are set using a menu (see Figure 5), which automatically inserts them at the beginning of the text when ESCAPE is pressed. Other formatting commands such as a short dash to begin or end underline or a caret to designate boldface must be inserted in the text at the appropriate point.

Select has all the expected features of a modern personal computer word processing package such as headers, footers, page numbering, merging blocks of text or entire documents, justification and the like. However, it has two important features rarely found in small systems: Teach and Spell.

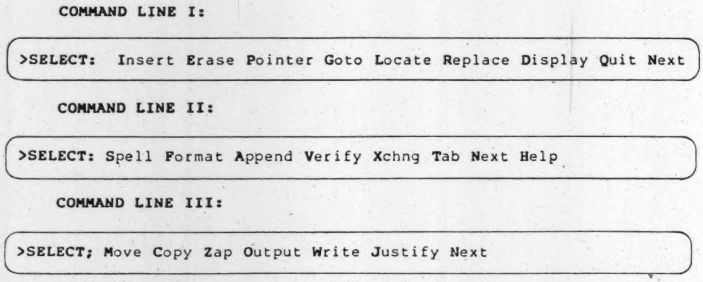
As I mentioned earlier, I learned to use *Select* in about 90 minutes using the Teach tutorial. While this is valuable in getting started, it is especially useful to the infrequent user of the system. Even after using *Electric Pencil* for 5 1/2 years, if I haven't written anything for a week or two, I frequently find myself leafing through the manual to find a particular format command. With *Select*, I could merely "turn to" Teach and review the operation of a little used command to refresh my memory as to its operation. An even shorter form of Teach is "Help" which contains a short description and example of each command and can be called while creating or editing a document without destroying anything.

Spell is a part of the *Select* package which automatically proofreads a document against a dictionary of 9346 words on the *Select* disk along with any others you might wish to add. The system identifies words which it thinks might be in error, displays each one, and asks if you wish to correct it or ignore it (say a deliberate misspelling or a trade name which is similar to a real word). I did not use Spell extensively, so I do not feel that I should pass judgment on it either way. It *seems* useful.



```
SELECT: Create Edit Delete View List Name Print Spell Teach Merg Help Quit Run

        Create - to CREATE a new document
        Edit   - to EDIT or change a document
        Delete - to DELETE a document
        View   - to get a scrolling VIEW of a document
        List   - to LIST all the documents in your directory
        Name   - to assign a new NAME to a document

        Print  - to PRINT a document
        Spell  - to check your SPELLING

        Teach  - to TEACH you to use SELECT
        Merge  - to MERGE a document with a mailing list
        Help   - to HELP explain the commands
        Quit   - to QUIT your SELECT work session

        Run    - to RUN a program outside SELECT
        Alter  - to place SELECT into program development mode
```

Figure 3. Main menu of Select offers 14 choices.



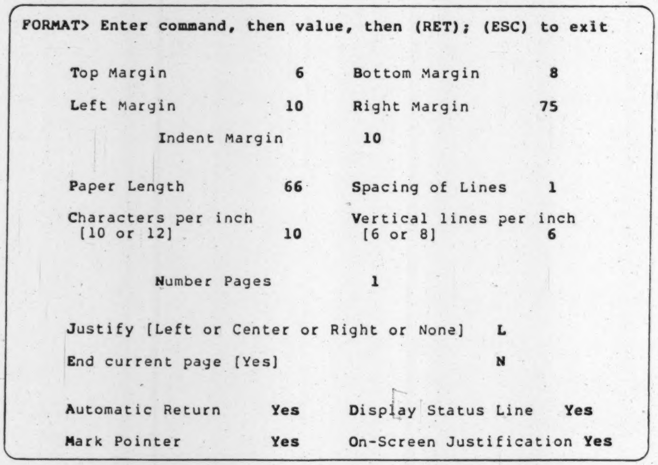
```
COMMAND LINE I:

>SELECT:  Insert Erase Pointer Goto Locate Replace Display Quit Next

COMMAND LINE II:

>SELECT: Spell Format Append Verify Xchng Tab Next Help

COMMAND LINE III:

>SELECT; Move Copy Zap Output Write Justify Next
```

Figure 4. Twenty-one commands can be invoked from Edit mode.

After my document got quite long (10 plus pages), the system started to act a bit flaky. I have no way of knowing whether this was hardware or software. At the end of a line when a long word is being typed, the software moves the word to the beginning of the following line, for example the word "started" at the beginning of this paragraph was moved when I typed the letter "e." However, on the next line the letters were altered and it became "uvctvgf." This did not happen every time, perhaps one line in every 20 or 30. I noted that it tended to occur more frequently when I was typing quickly.

Multiplan Spreadsheet Package

Multiplan is a spreadsheet calculation program similar to *VisiCalc* or *SuperCalc*. Rather than describing the entire package, I will simply note some similarities



```
FORMAT> Enter command, then value, then (RET); (ESC) to exit

     Top Margin             6     Bottom Margin       8

     Left Margin           10     Right Margin       75

             Indent Margin        10

     Paper Length          66     Spacing of Lines    1

     Characters per inch          Vertical lines per inch
      [10 or 12]           10      [6 or 8]           6

             Number Pages          1

     Justify [Left or Center or Right or None]   L

     End current page [Yes]                      N

     Automatic Return     Yes     Display Status Line   Yes

     Mark Pointer         Yes     On-Screen Justification Yes
```

Figure 5. Print formatting commands are selected from a menu.

valFORTH™ for Atari* 400/800

Professional Software for the Hobbyist

VALPAR INTERNATIONAL

FORTH has been used for years by ATARI* and others in programming their arcade games. FORTH is *fast*, 15-20 times faster than BASIC, and can make use of every capability for your computer. And it's no longer the province of the professional programmer! With valFORTH and the additional packages described below, you can create programs in an afternoon that would previously have taken weeks of hard work!

WHAT? YOU DON'T ALREADY KNOW FORTH?

Then take advantage of our special offer on *Starting Forth* by Leo Brodie. Widely acclaimed as the best book available on the subject, this entertaining treatment of Forth will make you comfortable with this exciting language quickly and easily. When you order *Starting Forth*, you get a free copy of our "Notes for the valFORTH User," including references, by page, to *Starting Forth*.

These are the utilities developed by Valpar International's software specialists and used to create our commercial software products.

valDOS NEW! By Popular Demand!

valDOS. Now you can use your valFORTH system to read and write normal Atari DOS Files created with valDOS or other sources. Also includes valDOS File Editor for creating and reading FORTH Source Code without "screens." (Not a general file editor.)

(Over 25 pages of documentation. Requires valFORTH.)

valFORTH T.M.

Package contains: fig-FORTH kernel with mathematical and stack operations machine-coded for higher speed than normal fig-FORTH; line editor AND screen editor, debugger, sound and graphics commands, floating point, advanced 6502 assembler, diskcopiers, and much more! (Over 110 pages of documentation)

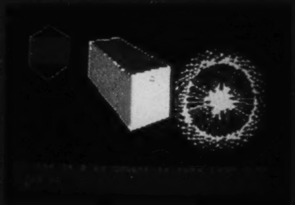
GENERAL UTILITIES AND VIDEO EDITOR

Utilities: 4 array types, 4 case types, text on graphics 8, extensive string manipulation and keyboard input, STICK & PADDLE, randoms, bit manipulation, and much, much more.

Editor: *fast, powerful, complete* valFORTH screen editor 1.1. A professional-quality tool that makes editing a pleasure.

(Over 60 pages of documentation. Requires valFORTH.)

PLAYER-MISSILE GRAPHICS, CHARACTER EDITOR, & SOUND EDITOR



Player-Missile: Create, move, color, change images of and bound players and missiles with high level commands. Full support of 5th player, multicolor players, etc. etc. All critical sections in machine code.

Character Editor: Compose character sets with joystick. Simultaneous display of created characters. Make images for players and missiles.

Sound Editor: Simple independent control of all four voices (one joystick per voice) and audio-control register. Create any single-setting sound with graphical and tabular readout.

(Over 35 pages of documentation. Requires valFORTH.)

VALPAR INTERNATIONAL
3801 E. 34TH STREET
TUCSON, ARIZONA 85713
Call Toll-Free 800-528-7070 In Arizona call (602) 790-7141

Principal Software Authors: Stephen Maguire and Evan Rosen

Atari is a trademark of Atari, Inc., a division of Warner Communications

Coming Attractions:
- ∗ TARGET COMPILER
- ∗ 3D WORLD

For more information *fast* and a 4TH ♥ IF HONK THEN bumpersticker, send 25¢ and a self-addressed, stamped envelope.

DISPLAY FORMATTER

Fast, simple creation of all types of display lists, with automatic 4K boundary jumping. Automatic or user controlled memory allocation, and formatting for horizontal and vertical scrolling, and display list interrupts.

(Over 30 pages of documentation. Requires valFORTH.)

TURTLE & valGRAPHICS AND ADVANCED FLOATING POINT ROUTINES

All graphics modes supported — even GTIA and "7+". Draw and fill commands *faster* and *smarter* than Basic. "Turn-toward" for "chasing" and vanishing point effects; point labeling, etc. Also SIN, COS, ATN, ATN2, etc. added to floating point.

(Over 35 pages of documentation. Requires valFORTH.)

Text Compression and Auto Text Formatting

A unique, two-part utility!

- Text Compression allows the packing of text into much less space than normally required. Useful for wordy Adventure games, "artificial intelligence," etc.!
- Auto Text Formatting takes both normal and compressed text and routes it to the video screen "windows."

(Over 20 pages of documentation. Requires valFORTH.)

---

valFORTH alone requires 24K
valFORTH plus one or more packages requires 32K minimum
Memory requirements include 10-12K working space.
All products are now on non-protected disks.
Over 270 pages of detailed documentation!

valFORTH	$45.00
General Utilities and Video Editor	40.00
Player Missile Graphics, Character Editor, and Sound Editor	40.00
Display Formatter	35.00
Turtle and valGraphics and Floating Point Routines	45.00
Text Compression and Auto Text Formatting	35.00
Heavy-Duty Professional Binder (provided free when ordering 3 or more packages at one time)	13.00

∗ Save $50.00 ∗
With an order of all six packages above, you pay only $203.00.

Starting Forth (published at $15.95)	14.00
valDOS and valDOS File Editor	$40.00

When ValForth and one or more additional packages are purchased and proof of purchase of APX Forth is furnished, a $15.00 credit will be given.

Plus Shipping and Handling

VISA and MASTERCARD accepted

CIRCLE 306 ON READER SERVICE CARD

and differences between *Multiplan* and *VisiCalc*.

Multiplan is produced by Microsoft Corp., Bellevue, WA and, on the Rainbow 100, offers a worksheet 255 rows long and 63 columns wide for words, numbers and formulas. The biggest difference between *Multiplan* and *VisiCalc* is the ability of one *Multiplan* worksheet to reference another. In other words, say one worksheet contains salary calculations consisting of employee names, regular and overtime hours, hourly rates and salaries, deductions, taxes, etc. A second worksheet may be a summary of department expenses. In this case, the second worksheet can reference just the final department summary salary expenses from the first without having to create an intermediate file or re-enter the data.

Another difference between *Multiplan* and *VisiCalc* is that *Multiplan* allows the creation of up to eight windows within the display area compared with two for *VisiCalc*. While this may sound four times as good, in three years of fairly heavy usage of *VisiCalc*, I have rarely used the two-window capability and can't imagine needing three or four windows, much less eight.

A nice feature of *Multiplan* is the message line at the bottom of the screen which displays comments on the progress of any command, and the percentage of remaining storage.

A not-so-nice difference is the convention in *Multiplan* of numbering both rows and columns. Thus in *VisiCalc*, a reference to Row 3 Column 2 is B3 whereas in *Multiplan* it becomes R3C2. Even worse is the handling of "relative" references. This is done automatically in *VisiCalc* as rows and columns are shifted. *Multiplan* requires the user to define a relative reference in advance. For example, to add Row 1, Column 1 to Row 1, Column 2 and put the result in Row 1, Column 3 so that it may later be shifted to make room for another row requires the following commands:

VisiCalc @SUM(A1+A2)

Multiplan V SUM(R[-2]C+R[-1]C)

VisiCalc: 11 keystrokes. *Multiplan*: 19 keystrokes. And the winner is . . .

I was also not impressed with the method of assigning labels in *Multiplan*. Typing any alphabetic character in *VisiCalc* automatically indicates a label whereas *Multiplan* requires that A (for alphabetic) be typed preceding a label.

Other differences are relatively minor. In most regards *Multiplan* behaves "as expected" and like *VisiCalc*, is an excellent tool for asking the all-important "what if?" questions of business planning and financial modeling.

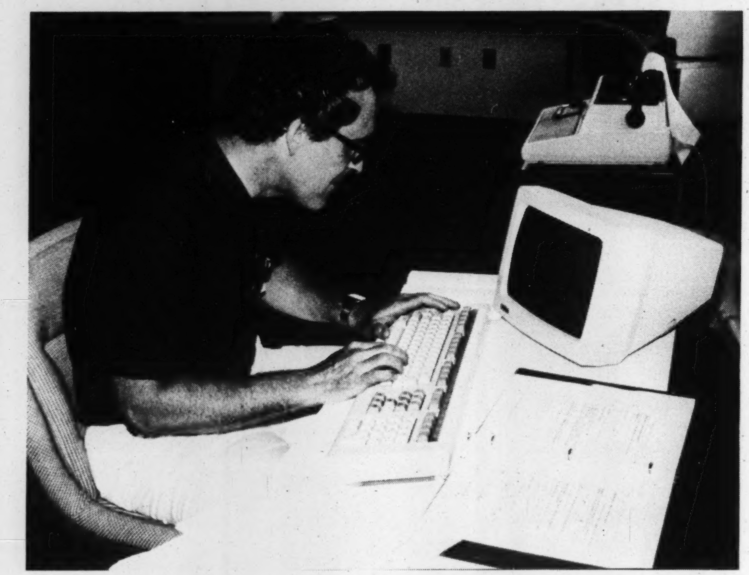


Photo 6. Author puts Rainbow 100 to the test.

Microsoft includes two fat 192-page instruction manuals with *Multiplan*. Unfortunately, I can only describe the styles as "written by programmers for programmers." These will soon be available in "DEC colors," presumably written in a more user-friendly style. In addition, Bob Montemerlo mentioned the possibility of adding a tutorial Teach mode similar to that of *Select*. Nothing definite yet.

Basic, C, et al

Standard Microsoft Basic (Version 5.26) is being offered with the Rainbow 100. It is the 8086 version and runs under CP/M 86. It is loaded from disk and occupies 29K of RAM. Assuming sufficient memory is available, Basic can use up to 64K. However, even if the optional 256K option is installed, Basic can still use just 64K.

The Basic is excellent with password-protected files, dynamic string space allocation and up to 40-character variable names. Structured statements include:

WHILE/END
IF/THEN/ELSE
nested IF/THEN/ELSE

Machine language calls, CHAIN and COMMON (Fortran, here I come!) as well as Trace and error trapping are also included. Table 1 shows selected characteristics.

However, given the excellent graphics of the Rainbow 100 hardware, I found it curious that DEC did not contract with Microsoft to include any graphics functions. I also wonder why the following features, all implemented in Microsoft Basic on the IBM PC, were not implemented on the Rainbow 100:

Graphics and music commands
Function keys
Device Independent I/O
TIME$ and DATE$
Screen editor

A spokesman from Microsoft told me that an extended Basic with these features *might* be offered by Microsoft at some future date to run under MS-DOS. The Rainbow 100 is available with MS-DOS (Microsoft Disk Operating System) as an alternative to CP/M 86/80. At this point the main advantage to MS-DOS is that under it, industry standard disks can be read. Also, a few software packages are available for MS-DOS that are not available under CP/M.

Incidentally, at NCC people from DEC were bragging that their Basic didn't have that nasty divide by 0.10 bug in IBM PC Basic. Sorry, guys, yes it did. But it doesn't

Characteristic	**Implementation**
Name length	40 characters
Integer arithmetic	Yes
Multi-statement functions	No
Function recursion	Yes
Statement numbers	0 to 65535
Floating point precision	7 single 16 double
Exponent	±38
Nested IF	Yes
Link to machine language	Yes
Maximum array dimension	255
CHAIN and COMMON	Yes
Error trapping	Yes
Trace features	Yes

Table 1. Selected features of Rainbow 100 Basic (Microsoft version 5.26).

OF ALL THE THINGS YOU BUY, HOW MANY ARE GOOD ENOUGH TO BE WARRANTED 5 YEARS?

Few disks stand the test of time. Because few are built to the precision standards or certified to the critical levels of Omni's complete line.

Each Omni disk is rated for 12 million passes without disk-related errors or significant wear. Each is certified error-free at a minimum of twice the error-threshold of your system. And built to exceed all industry specifications including those of ANSI, ECMA, ISO and virtually every drive manufacturer. So you can count on them for the long haul. We guarantee it.

Call toll-free (800 343-7620) for your nearest dealer. In Mass., call 617 799-0197.

Omni Resources, 4 Oak Pond Ave.,
Millbury, Mass. 01527

Dealers. Software houses.

Check our prices, services and specifications. We offer duplicating, formatting, private labeling, small minimums, fast delivery and copy protection schemes on disks for virtually any system.

OMNI

THE DISK GOOD ENOUGH TO BE WARRANTED 5 YEARS

CIRCLE 237 ON READER SERVICE CARD

The Software: **PROGRAMS**

MICROPRO

WordStar®

The number one selling microcomputer word processing package in the world.

8" CP/M®

LIST PRICE: 495.00
MH PRICE: 289.00

5¼" APPLE®

LIST PRICE: 375.00
MH PRICE: 234.00

MICROPRO

MailMerge™

A multi-purpose text-data merging program. One of its most popular uses is producing personalized form letters. Requires WORDSTAR®

8" CP/M®

LIST PRICE: 150.00
MH PRICE: 99.00

5¼" APPLE®

LIST PRICE: 125.00
MH PRICE: 83.00

MAILMERGE, DATASTAR, SPELLSTAR, CALCSTAR, and SUPERSORT are trademarks of MicroPro International, San Rafael, California USA.
QUICKCODE, QUICKSCREEN, anddUTIL are trademarks of Fox & Geller Associates.
VISITREND/VISIPLOT, VISIFILE, VISISCHEDULE, VISIDEX, VISITERM, and DESKTOP PLAN are trademarks of VisiCorp.
dBASE II is a trademark of Ashton-Tate.
MATHSTAR is a trademark of Force Two, LTD.
SUPERCALC is a trademark of Sorcim.
SPELLGUARD is a trademark of Innovative Software Applications.
T.I.M. is a trademark of Innovative Software, Inc.
CROSSTALK is a trademark of MicroStuf.
EASY WRITER and EASY SPELLER are trademarks of Information Unlimited Software.
PERFECT WRITER and PERFECT SPELLER are trademarks of Perfect Software, Inc.
WORDSTAR is a registered trademark of MicroPro International, San Rafael, California USA.
VISICALC is a registered trademark of VisiCorp.
CP/M is a registered trademark of Digital Research.
APPLE is a registered trademark of Apple Computers.
IBM is a registered trademark of International Business Machines.

MICROPRO

DataStar™

The office-oriented system for data entry, retrieval, and updating. DATASTAR allows you to create a form, be it a price list, catalog, or order form. You can edit, update, or save this information in a file or simply print it out. DATASTAR interfaces with MAILMERGE and SUPERSORT.

8" CP/M

LIST PRICE: 350.00
MH PRICE: 235.00

5¼" APPLE®

LIST PRICE: 295.00
MH PRICE: 199.00

MICROPRO

CalcStar™

Financial planning and business decision-making made simpler, faster, and more accurate. CALCSTAR calculates solutions to complex numerical problems in business and finance. CALCSTAR turns your microcomputer's video screen into a 'window' on a gigantic electronic ledger sheet with up to 600 entries arranged the way you want.

8" CP/M®

LIST PRICE: 295.00
MH PRICE: 199.00

5¼" APPLE®

LIST PRICE: 195.00
MH PRICE: 149.00

FORCE TWO. LTD.

MathStar™

MATHSTAR is a combination adding machine/calculator program, designed specifically for use with MicroPro's WORDSTAR®. Provides basic math functions, formatted results, and accounting notation.

8" CP/M®

LIST PRICE: 125.00
MH PRICE: 99.00

5¼" APPLE®

Same as 8" CP/M*

ASHTON-TATE

dBASE II™

THE database management system for the microcomputer.

8" CP/M®

LIST PRICE: 700.00
MH PRICE: 489.00

5¼" APPLE®

Same as 8" CP/M*

FOX & GELLER

QuickCode™

QUICKCODE allows dBASE II users to create the following programs, in a matter of seconds, without programming.

- ☐ Data entry programs
- ☐ Data retrieval programs
- ☐ Date edit/validation programs
- ☐ Menus
- ☐ dBASE II files

PLUS: 4 New Data Types:

- ☐ Date
- ☐ Dollars
- ☐ Telephone
- ☐ Social Security number

QUICKCODE includes a powerful new version of QUICKSCREEN, the dBASE II screen builder.

8" CP/M®

LIST PRICE: 295.00
MH PRICE: 249.00

5¼" APPLE®

Same as 8" CP/M*

FOX & GELLER

dUTIL™

dUTIL is the BASE II utility program which saves valuable computer time and work by:

- ☐ Increasing command file running time
- ☐ Creating standard text files to use within your word processor
- ☐ Automatically debugging dBASE II command files

dUTIL does not require QUICKCODE or QUICKSCREEN.

8" CP/M®

LIST PRICE: 99.00
MH PRICE: 75.00

5¼" APPLE®

Same as 8" CP/M*

Call Toll·Free: **1·800·523·9511** In Pennsylvania: **1·215·868·8219**

The Software: **PACKAGES**

		CP/M®		APPLE®	
		COMBINED LIST PRICE:	MICROHOUSE PRICE:	COMBINED LIST PRICE:	MICROHOUSE PRICE:
MH-1	WORDSTAR® /MAILMERGE	645.00	**319.00**	500.00	**259.00**
MH-2	WORDSTAR® /MAILMERGE/DATASTAR	995.00	**519.00**	795.00	**399.00**
MH-3	WORDSTAR® /CALCSTAR	790.00	**419.00**	570.00	**299.00**
MH-4	WORDSTAR® /MATHSTAR	620.00	**369.00**	500.00	**319.00**
MH-5	dBASE II/WORDSTAR® /MAILMERGE	1345.00	**819.00**	1200.00	**719.00**
MH-6	dBASE II/QUICKCODE/ WORDSTAR® /MAILMERGE	1640.00	**999.00**	1495.00	**899.00**
MH-7	dBASE II/QUICKCODE/dUTIL	1070.00	**749.00**	1070.00	**749.00**

Great Savings on Apple® Software and Hardware Accessories.

Microhouse 1444 Linden Street / P.O. Box 498 Bethlehem, Pennsylvania 18016

Prices and specifications subject to change without notice.

All items subject to availability.

MICROHOUSE™

The Microcomputer People.™

CIRCLE 212 ON READER SERVICE CARD

anymore. The bug was in all Microsoft Basic implementations, and when they fixed one they fixed them all.

C, a structured language generally available under the Unix operating system, is also available on the Rainbow 100. I did not have an opportunity to use C, however, those familiar with the language will appreciate the full implementation (not Tiny C) on Rainbow.

Service

The personal computer market has grown up much more closely allied with the consumer electronics industry (hi-fi, video games, auto sound, TV, video, etc.) than with the traditional computer industry. After all, consider how many personal computers are sold in retail stores like hi-fi systems versus those sold by a salesman calling on a customer with field service and software support contracts as part of the deal.

DEC, is attempting to bridge this gap by offering a choice of five levels of service.

A friendly "Do Me First" Computer-Based Instruction course is available with all the personal computers and is standard on the two Professional models. This interactive course is designed to help users learn, use, and quickly become productive on a system.

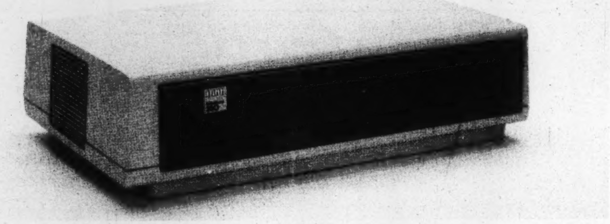
For users with critical requirements, DEC offers an On-Site System Support Agreement—a total service package. This covers both hardware and the operating system. Part of this service is a toll-free "help line" that provides response to questions concerning installation, warranty, hardware, software, accessories and supplies.

A slightly lower level of service is Carry-In offered on both a contract (second level) and per-call basis (third level). All systems have a set of diagnostics built in which helps the user locate the source of any problems with diagnostic messages on the screen or, in the event of screen failure, with LEDs on the system board. Carry-In service offers quick repairs of user-diagnosed problems as well as a toll-free help line, engineering modifications, and updates.

A fourth level of service is Mail-In designed for those capable of doing their own system maintenance. Using the built-in diagnostics, you isolate the faulty part and mail (or bring) it in. After testing by the service center, a new or repaired replacement part is sent to you.

Finally, self-maintenance is available for those who wish to keep their own inventory of spare part kits.

In the past, DEC maintenance has had a reputation for being reasonably good as long as you signed the contract or paid the price (not cheap!). However, Andy Knowles emphasized that service on the personal computers is an area in which DEC is determined to be competitive with everyone in price, quality, and flexibility.



Pricing and Delivery

When I initially priced out the systems shown in the pricing chart, my reaction

System Configurations and Pricing

1. Basic Programming System

PC100	System unit, 64K RAM, dual disk drive	$2675
PC1K1-AA	Keyboard unit-USA	245
VR291A	Monitor 12", B&W	325
QV012-A3	CP/M 86/80 operating system	250
QA066-C3	MBasic	250
TOTAL		$3745

2. Spreadsheet/Word Processing System

PC100	System unit, 64K RAM, dual disk drive	$2675
PC1K1-AA	Keyboard unit-USA	245
VR201A	Monitor 12" B&W	325
QV012-A3	CP/M 86/80 operating system	250
QA061-C3	*Select* word processing package	595
QA063-C3	*Multiplan* spreadsheet package	275
PCXXF-BA	Floor stand	99
LA50-RA	100 cps printer	950
TOTAL		$5414

3. Advanced Programming and Graphics System

PC100	System unit, 64K RAM, dual disk drive	$2675
PC1K1-AA	Keyboard unit-USA	245
VR241-A	Color monitor	1325
QV012-A3	CP/M 86/80 operating system	250
PC 1XX-AA	64K RAM memory expansion	495
PC 1XX-BA	Graphics display option	845
QA066-C3	MBasic	250
LA100	Letterprinter 100	3000
TOTAL		$9085

4. Problem Solving, Spreadsheet, Communications System

PC100	System unit, 64K RAM, dual disk drive	$2675
PC1K1-AA	Keyboard unit-USA	245
PC1XX-AB	192K RAM memory expansion	1095
PC1XX-BB	External capabilties option	500
RCD50-BA	Winchester 5M subsystem	3700
PCXXF-BA	Floor stand	99
QV012-A3	CP/M 86/80 operating system	250
QA063-C3	*Multiplan* spreadsheet package	275
QA068-C3	C language	500
QV015-A3	CX/DX/VT102 communications package	200
LA100	Lineprinter 100	3000
TOTAL		$12539

was "GULP!" They *seemed* much more expensive than the competition.

But let's consider three system configurations for spreadsheet calculations. All three include CPU, 128K memory, keyboard, B&W display, one disk drive (two on Rainbow 100), DOS and spreadsheet software.

	System	Printer	Total
DEC Rainbow 100	4265	$950	$5215
Apple III	4690	525	5215
IBM PC	3735	810	4745

Viewed in this light, the DEC Rainbow 100 is right on target. Considering the included dual processors and dual floppy drive, it may even be a bargain.

I think the reason ~~for~~ my initial "gulp" is mainly because the lowest entry price system ($2745) is $1000 to $2000 above other entry systems. Also, the software packages are rather pricey—$250 for DOS, $250 for Basic, $275 for a spreadsheet, $595 for word processing and $395 each for payroll, accounts receivable, accounts payable, inventory, and general ledger.

On the other hand, the Rainbow 100, while hardly pushing the state of the art, has those dual processors, dual disk drives, excellent keyboard and, perhaps best of all, the Digital name.

Some years ago, the IBM name was thought to be worth 20 to 25% of the price of a computer. In other words a competitor would have to be *more* than 20-25% lower than IBM to be in the running. In the miniworld, the same is true with DEC today although the differential is probably more like 15%. However, as a result of the enormous mini customer base and excellent reputation of DEC, it is likely that the DEC personal computers will find a ready market.

Will the DEC entries harm Apple, IBM or Tandy? I doubt it. If anything, the biggest effect will be to further legitimatize the personal computer itself as another blue chip name is added to the field.

Delivery on most units of the Rainbow 100 system is being quoted as Q4 '82. I wish I could say this meant October but if the experience of other manufacturers is any guide, December 31, 1982 is probably more like it.

Conclusion

Perhaps the most significant feature of the Rainbow 100 is the incorporation of both an 8-bit Z80 and 16-bit 8088 processor along with a "soft-sense" operating system, CP/M 86/80, to automatically run applications software on the correct processor.

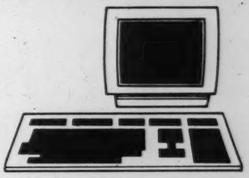
Selecting CP/M as an operating system instead of the more Unix-like Oasis or a proprietary DEC system is also significant since it immediately makes available a large number of practically off-the-shelf applications software packages. Having a 16-bit processor built in insures that this will continue to be true.

Hardware-wise, the keyboard is outstanding. I also like the idea of two double density floppy disks on one drive spindle. The immediately available optional 5 megabyte Winchester disk means that storage should be ample for virtually any application.

I find the *Select* Word Processing package and *Multiplan* spreadsheet package curious choices. However, given the comparatively high prices of these packages, I would guess it will not be long before other software vendors jump in and widen the range of choices in these two most important areas.

Bottom line: the Rainbow 100 should have a long successful life. ☐

CIRCLE 351 ON READER SERVICE CARD



5! Count 'em, 5 casino games in one great package.

Blackjack. Keno. Roulette. Poker. Baccarat. All favorites of Monte Carlo, Vegas and Atlantic City.

Pick your game. Take your $1000 stake and try your luck. Every bet is a thrill, and a chance to beat the house.

[illegible] for everyone because there's an exciting game for everyone. **CASINO.** You can bet on it!

5 game disk, $39.95 for Apple II*. At computer stores, or:

DATAMOST
9748 Cozycroft Ave.
Chatsworth, Ca 91311
(213) 366-7160

[illegible] MASTERCHARGE accepted. $1.00 shipping/handling charge. (Calif. residents add 6% tax.)

[illegible] is a trademark of Apple Computer, Inc.

CIRCLE 163 ON READER SERVICE CARD

DODGING TREES, ROCKS, CHICKENS, AND COPS AT OVER 80 MPH MAY NOT BE LEGAL.

BUT IT SURE IS FUN!

Grab the wheel in *Hazard Run,* our high-speed cross-country chase . . . and watch the feathers fly! It's just one example of the high-involvement exciting game software created by Artworx. At Artworx, we're directly involved with the software we sell. We know our game software is fun to play because our own people can't keep their hands off it. We created *Beta Fighter* to simulate a moonscape battle that will literally take you out of this world! Our *Drawpic* software lets people of all ages get hooked with the limitless possibilities of graphic creation. *Golden Gloves* gives you all the thrills and slam-bang action of a super slugfest, right down to the noise of the crowd!

At Artworx, we have a full range of software . . . for people who like to play and people who want to turn work into play. We have text editing, mail list, and analytical programs, to name but a few. How good are they? We use them in our own business . . . and we welcome your comments and suggestions. We pride ourselves on a line that's complete, unique, diverse, and offers you a great value for a very reasonable price.

At Artworx, we're as accessible as your local computer store or your telephone. Write or call us toll-free at 800-828-6573. We'll send you our free catalog . . . it's good reading and a great introduction to a whole new world of fun.

Artworx™

So you can play.

Artworx Software Company, Inc., 150 North Main St., Fairport NY 14450 (716) 425-2833

We look at a new computing tool kit for professionals in engineering, architecture, finance, education—for anyone who uses mathematical formulas.

creative computing software evaluation

TK! Solver from Software Arts

David H. Ahl

When Dan Bricklin and Bob Frankston, creators of *VisiCalc*, decided to go it alone, it created quite a stir in the business press. *Business Week*, *Fortune* and other magazines all did stories describing and speculating about their fledgling company, Software Arts.

Buoyed by the phenomenal success of *VisiCalc*, Software Arts is off to a flying start. During a visit to their cramped offices on the 12th floor of one of the few high rise buildings in Cambridge, MA, one of the first things that Dan showed me were the architectural plans for a 20,000 sq. ft. facility in Newton, MA. Bob Frankston was quick to point out that their "new" 60-year old building had a dock along the Charles and could be reached by canoe from Cambridge in about 40 minutes.

I remarked that when Creative moved into its 25,000 sq. ft. facility about 18 months ago, I had thought I might sublease about 10,000 sq. ft. However, within three months of moving in, it became apparent that if we had 1,000 sq. ft. to sublease it would be a lot. Dan mentioned that when Software Arts first contracted to renovate the space they had planned to lease out the first floor (about 10,000 sq. ft.) but now, three months later, they are wondering if the building has enough space for their own rapidly-expanding operation.

An impressive operation it is! A Prime computer with a zillion megabytes of storage serves as the main software development machine. Scores of microcomputers are wired into this system. While the communication links are direct today the new facility will be totally wired for Ethernet to allow micro-to-micro communication as well as micro-to-mainframe.

I have rarely seen so many microcomputers both in quantity and variety in one location as I saw at Software Arts. Major projects include development of an advanced version of *VisiCalc* (to be marketed through VisiCorp), conversion of *VisiCalc* to every imaginable computer and, of course, the TK!Solver development work.

What is TK!Solver?

TK!Solver (TK for Tool Kit) was designed to provide professionals in engineering, business and other fields a personal computing tool with which to solve problems involving mathematical calculations and analysis. As with *VisiCalc*, it is not necessary to know a programming language to use *TK!Solver*. The user simply types in one or more equations and the known variables. *TK!Solver* then solves for the missing variables using either a direct solve technique or, if necessary, an iterative technique.

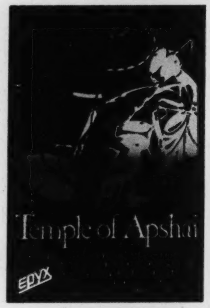
I journeyed to Cambridge to beat on *TK!Solver* mercilessly for nine non-stop hours. I asked the folks there to leave me alone with the software and documentation; after all, I wanted to approach it as a typical user. Diane Curtis, product manager for *TK!Solver*, kindly lent me her IBM Personal Computer and a corner of her cramped office for the day while she spent time with some customers and consultants.

My occasional questions were quickly

Dan Bricklin shows me a fine point of iterative problem solving with TK! Solver.

Slaying Monsters Should Be Mostly Fun and Games

An EPYX game from Automated Simulations

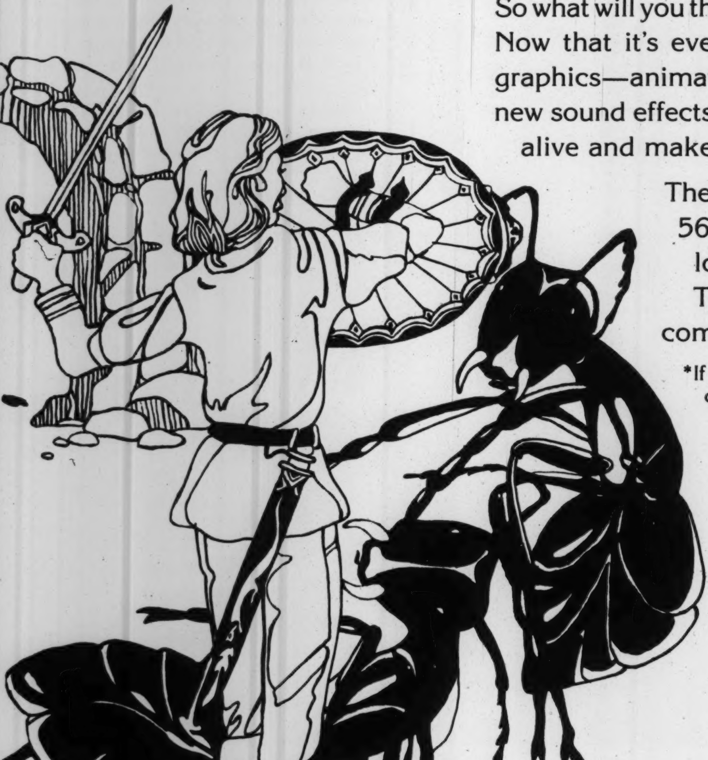


Be one of more than 16 million alter-egos that your computer can generate. Walk into a labyrinth filled with traps, treasures and monsters. There you'll test your strength, constitution, dexterity, intelligence . . . against thousands of monsters in over 200 caverns and chambers—growing in wealth, power and experience as you progress through the four levels of the dungeon.

Your character will do whatever you want him to do. Do battle—in real time—with the likes of giant ants, ghouls, zombies. . .Explore the various levels of the maze and discover the great treasures within.

The Game Manufacturer's Association named The Temple of Apshai the computer game of the year. The Temple is the very first computer game—ever to win the Hobby Industry award for excellence. There can be only one reason for that: it's a great game.

So what will you think of The Temple of Apshai now? Now that it's even better than ever. With better graphics—animated movement—and completely new sound effects that make your computer come alive and make The Temple even more fun.*



The Temple has a superbly illustrated 56-page Book of Lore, and your local dealer has it for the ATARI,** TRS-80,** APPLE,** and IBM** computers.

*If you already have The Temple of Apshai, you can enjoy these great improvements. Just send us your original cassette or disk together with your check for $5.00 and we'll send you the brand new version—with better-than-ever graphics and sound.

**ATARI, TRS-80, APPLE and IBM are trademarks of Atari, Inc., Tandy Corp., Apple Computer, Inc., and IBM, respectively.

©1981, **AUTOMATED SIMULATIONS, INC.,** P.O. Box 4247, Mountain View, Ca., 94040.

EPYX COMPUTER GAMES THINKERS PLAY

CIRCLE 116 ON READER SERVICE CARD

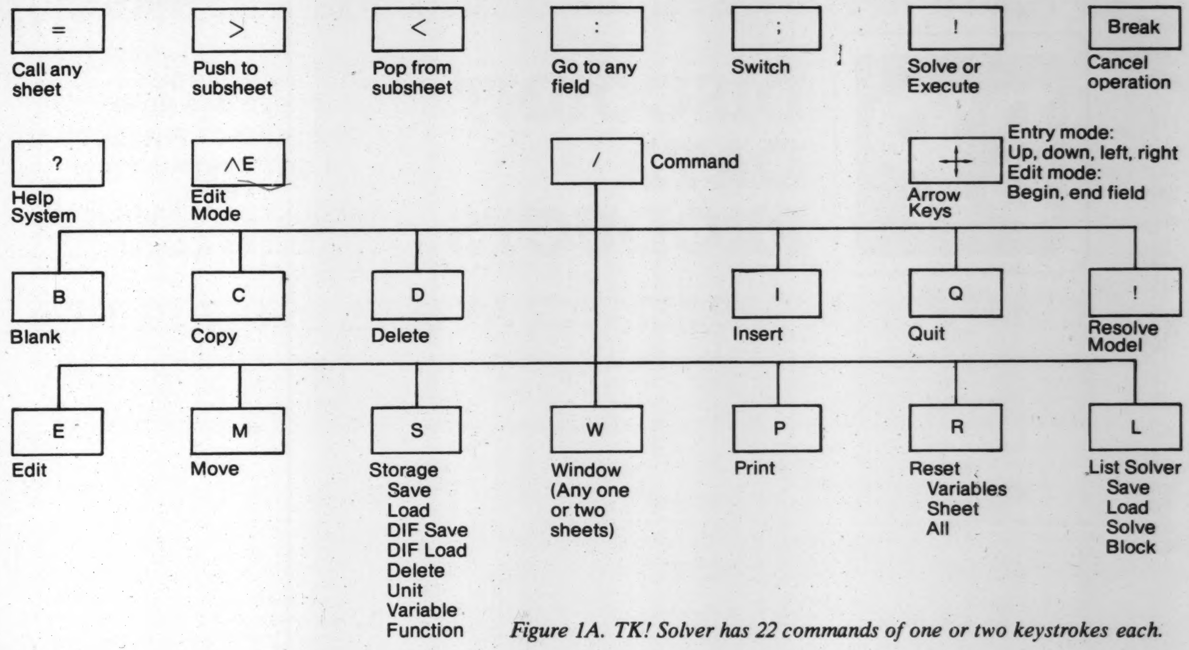

=
Call any sheet
>
Push to subsheet
<
Pop from subsheet
:
Go to any field
;
Switch
!
Solve or Execute
Break
Cancel operation
?
Help System
^E
Edit Mode
/
Command
Arrow Keys
Entry mode: Up, down, left, right
Edit mode: Begin, end field
B
Blank
C
Copy
D
Delete
I
Insert
Q
Quit
!
Resolve Model
E
Edit
M
Move
S
Storage
Save
Load
DIF Save
DIF Load
Delete
Unit
Variable
Function
W
Window (Any one or two sheets)
P
Print
R
Reset
Variables
Sheet
All
L
List Solver
Save
Load
Solve
Block

Figure 1A. TK! Solver has 22 commands of one or two keystrokes each.

answered by the genial folks at Software Arts but, for the most part, the account that follows represents the independent exploration of *TK!Solver* by a more-or-less typical user.

Getting Started

Upon loading the system, a two-line Message Area appears at the top of the screen. The first line, the Status Line, displays information about the status of the program. The second line, the Prompt/Error Line, displays messages.

The position indicator at the far left of the Status Line tells you the position of the cursor with a row number and letter (representing the label of the column). To the right of it is the contents of that field (data, label, etc.). This may seem redundant, but it is very useful because it shows the entire contents even though it may be more than can be displayed in the field, e.g., the status area may show a 20-character label or an 11-digit number even though the field may display only six or eight characters.

On the far right of the Status Line is a Memory Indicator which shows the amount of remaining memory in your work area. A handy feature is the message "Low" which is displayed when memory capacity drops below 1000 bytes. Essentially this cries out, "Save your file on disk before you lose it!"

The last character on the Status Line is a Solution Indicator. When you enter equations, an exclamation point appears here indicating that they are unsolved. It disappears upon solving a model but reappears if any changes are made.

The Prompt/Error line is used for prompts which require a response, for messages telling the status of the program, and for error messages.

Help, Help!

The Help Facility is always available. It reminds you of features and commands you have learned but may not remember. However, as the instruction booklet points out, "It is not intended as a substitute for the Instruction and Reference Manuals."

When the first *TK!Solver* sheets are displayed, the Prompt/Error line displays the message:

For Help, type ?

This prompt disappears when you type any key. If you type "?", the Prompt/Error line displays the message:

Help: ? or topic:

The cue remains on the Prompt/Error line so that you can type and enter either a question mark or a topic you want to be explained.

A Menu of Commands

TK!Solver has a menu of 22 commands (see Figure 1A). These commands are used to enter formulae and data, manipulate data and units, solve equations, and move among the sheets, windows and operations. Sound complicated? It's really not. (The 11 sheets are shown in Figure 1B—more about them later.)

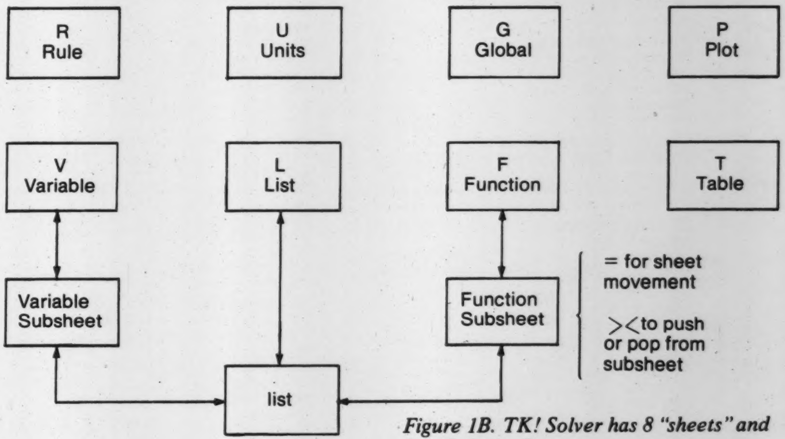

R
Rule
U
Units
G
Global
P
Plot
V
Variable
L
List
F
Function
T
Table
Variable Subsheet
Function Subsheet
list
= for sheet movement
>< to push or pop from subsheet

Figure 1B. TK! Solver has 8 "sheets" and 3 "subsheets."

ATARI·TRS-80·APPLE·ATARI·IBM·XEROX·PET·VIC·NEC·CP/M

DISCOUNT DATA PRODUCTS

THINK ABOUT
CHRISTMAS NOW!
THE PERFECT PRESENT
A GIFT CERTIFICATE
FROM
DISCOUNT DATA PRODUCTS
GIVE US A CALL!

COMPUTER STORE SERVICE AT MAIL ORDER PRICES

APPLE

		LIST PRICE	**OUR PRICE**
★ ACCENT SOFTWARE			
ADVENTURE INTERNATIONAL			
Commbat	D	24.95	19.95
Rear Guard	D	29.95	23.95
Tunnel Terror	D	29.95	23.95
War	D	24.95	19.95
S.A.G.A. #1-12 each	D	29.95	23.95
★ APPLIED SOFTWARE TECHNOLOGY			
★ ARTSCI ★ ASHTON-TATE			
★ ASTAR INTERNATIONAL CO.			
AUTOMATED SIMULATIONS			
Fore!	D	29.95	23.95
Temple of apshai	D	39.95	31.95
Crush, Crumble & Chomp	D	29.95	23.95
Upper Reaches of Apshai	D	19.95	15.95
★ AVALON HILL GAME COMPANY			
AVANT-GARDE CREATIONS			
HI-RES Secrets	D	125.00	99.95
HI-RES Computer Golf	D	29.95	**20.95‡**
BEAGLE BROS.			
DOS Boss	D	24.00	19.20
Utility City	D	29.50	23.50
Alpha Plot	D	39.50	31.95
Tip Disk #1	D	20.00	15.95
Apple Mechanic	D	29.50	**20.95‡**
★ BEZ			
BRODERBUND SOFTWARE			
Apple Panic	D	29.95	23.95
David's Midnight Magic	D	34.95	27.95
The Arcade Machine	D	44.95	35.95
Star Blazer	D	31.95	25.50
Choplifter	D	34.95	**24.45‡**
Serpentine	D	34.95	27.95
HI-RES ADv. #1 - Dead. Sec.	D	34.95	27.85
BUDGECO			
Raster Blaster	D	29.95	23.95
CALIFORNIA PACIFIC			
Bill Budge's 3D Graphics	D	39.95	31.95
Ultima	D	39.95	31.95
CAVALIER COMPUTER			
Bug Attack	D	29.95	23.95
Microwave	D	34.95	27.95
CONTINENTAL SOFTWARE			
The Home Accountant	D	74.95	59.95
1st Class Mail	D	74.95	59.95
CPA Modules #1-4 (each)	D	250.00	199.95
CPA Module #5	D	495.00	395.95
★ CPU SOFTWARE			
DAKIN 5/LEVEL 10			
Alkemstone	D	39.95	31.95
Programming Aids	D	90.00	71.95
Worm Hole	D	29.95	23.95
DATAMOST			
Snack Attack	D	29.95	23.95
Thief	D	29.95	23.95
County Fair	D	29.95	23.95
Swashbuckler	D	34.95	27.95
Casino	D	39.95	31.95
Baseball	D	29.95	23.95
DATASOFT			
Tumble Bugs (Dung Beetles)	D	29.95	23.95

		LIST PRICE	**OUR PRICE**
★ DENVER SOFTWARE			
★ DON'T ASK SOFTWARE			
★ DOUBLE GOLD SOFTWARE			
EDU-WARE			
Statistics	D	29.95	23.95
Spelling Bee w/Read. Primer	D	39.95	31.95
Algebra 1	D	39.95	31.95
Algebra 2	D	39.95	31.95
Empire I World Builders	D	32.95	26.95
Empire II Interstellar Sharks	D	32.95	26.35
Empire III Armageddon	D	32.95	26.35
Rendevous	D	39.95	31.95
GEBELLI SOFTWARE			
Zenith	D	34.95	**24.45‡**
Phaser Fire	D	29.95	23.95
★ HAYDEN SOFTWARE			
★ HAYES MICROCOMPUTER PRODUCTS			
★ HIGHLANDS COMPUTER SERVICES			
★ HOWARD SOFTWARE			
INFOCOM			
Zork I	D	39.95	31.95
Zork II	D	39.95	31.95
Deadline	D	49.95	**34.95‡**
★ INNOVATIVE DESIGN SOFTWARE			
INSOFT			
GraForth II	D	75.00	60.75
Electric Duet	D	29.95	23.95
★ ISM ★ IUS ★ LAZER SYSTEMS			
★ KENSINGTON MICROWARE LTD.			
LIGHTNING SOFTWARE			
Master Type	D	39.95	**27.95‡**
MICRO LAB			
Peeping Tom	D	34.95	27.95
Data Factory 5.0	D	300.00	239.95
Wall Streeter	D	300.00	239.95
MICROSOFT			
Olympic Decathlon	D	29.95	**20.95‡**
Typing Tutor II	D	24.95	19.95
TASC Compiler	D	175.00	139.95
FORTRAN-80	D	195.00	154.95
A.L.D.S.	D	125.00	99.95
BSAIC Compiler	D	395.00	319.95
COBOL-80	D	750.00	599.95
SoftCard	A	395.00	**299.95‡**
MICROTEK			
BAM 16K Memory Board	A	119.50	95.95
MUSE			
The Voice	D	39.95	31.95
Three Mile Island	D	39.95	31.95
Robot War	D	39.95	**27.95‡**
Castle Wolfenstein	D	29.95	23.95
Supertext 40/56/80	D	175.00	139.80
ON-LINE SYSTEMS			
HI-RES Adv. #2 - Wiz & Prin.	D	32.95	26.35
HI-RES Adv. #3 - Cranston M.	D	34.95	**24.65‡**
HI-RES Adv. #4 - Ulysess	D	34.95	27.95
HI-RES Adv. #5 - Time Zone	D	99.95	79.96
Mouskattack	D	34.95	27.95
Ultima II	D	59.95	47.95
Threshold	D	39.95	**27.95‡**
The Dictionary	D	99.95	79.95
Screenwriter II	D	129.95	98.95

		LIST PRICE	**OUR PRICE**
The Artist	D	99.95	79.95
Frogger	D	34.95	27.95
E.P.F. IV	D	79.95	63.95
Cannonball Blitz	D	34.95	27.95
Expediter II +	D	135.95	108.75
Laffpak	D	34.95	27.95
Screenwriter Pro. System	D	199.95	159.95
PENGUIN SOFTWARE			
Complete Graphics Sys.	D	69.96	55.96
Special Effects	D	39.95	31.95
Graphics Magician	D	59.95	47.95
PICCADILLY			
Falcons	D	29.95	23.95
Star Blaster	D	29.95	23.95
Ribbit	D	29.95	23.95
PHOENIX SOFTWARE			
The Birth of the Phoenix	D	22.00	17.50
Zoom Grafix	D	39.95	**27.95‡**
QUALITY SOFTWARE			
Bag of Tricks	D	39.95	**27.95‡**
Beneath Apple DOS	B	19.95	15.95
SENSIBLE SOFTWARE			
Super Disk Copy III	D	30.00	23.95
Multi Disk Catalog III	D	25.00	19.95
Disk Recovery	D	30.00	23.95
Applesoft Program Opti.	D	20.00	15.95
Disk Organizer II	D	30.00	20.95
DOS Plus	D	25.00	19.95
Quickloader	D	25.00	19.95
Image Printer - Epson	D	40.00	31.95
Sensible Speller	D	125.00	99.95
SENTIENT SOFTWARE			
Cyborg	D	32.95	26.50
Congo	D	34.95	27.95
Goldrush	D	34.95	27.95
SIRIUS SOFTWARE			
Space Eggs	D	29.95	23.95
Gorgon	D	39.95	31.95
Sneakers	D	29.95	23.95
Hadron	D	34.95	27.95
Kabul Spy	D	34.95	27.95
Minotaur	D	34.95	27.95
Bandits	D	34.95	27.95
Escape From Rungistan	D	29.95	**20.95‡**
The Joyport	A	74.95	59.95
Freefall	D	29.95	23.95
SIR-TECH SOFTWARE			
Wizardry	D	49.95	39.95
Knight of Diamonds (sc. #2)	D	34.95	**24.45‡**
SOFTWARE PUBLISHING CORP.			
PFS: Report (New Improved)	D	95.00	76.95
PFS: (New Improved)	D	125.00	99.95
PFS: Graph	D	125.00	99.95
★ SOUTHEASTERN SOFTWARE			
SOUTHWESTRN DATA SYSTEMS			
Ascii Pro	D	129.95	103.95
Correspondent	D	59.95	47.95
Merlin	D	64.95	51.95
The Routine Machine	D	64.95	51.95
Z-Term "The Pro"	D	150.00	119.95
P-Term	D	129.95	103.95
Munch-A-Bug	D	49.95	**34.95‡**

XEROX·TRS-80·APPLE·ATARI·IBM·XEROX·PET·VIC·NEC·CP/M·TRS-80·APPLE·ATARI

ROX·TRS-80·APPLE·ATARI·IBM·XEROX·PET·VIC·NEC·CP/M

TRS-80·APPLE·ATARI·IBM·XEROX·PET·VIC·NEC·CP/M·APPLE·ATARI·IBM·XEROX·PET·VIC·NEC·CP/M·APPLE·ATARI·IB

STONEWARE PRODUCTS			
D.B. Master	D	229.00	**160.95‡**
D.B. Master Utility Pak #1	D	99.00	79.95
D.B. Master/Hard Disk	D	499.00	379.95
D.B. Master Utility Pak #2	D	99.00	79.95
D.B. Master Stat Pac	D	99.00	78.95
Graphics Processing Sys.	D	99.95	79.95
★ STRATEGIC SIMULATIONS			
SUBLOGIC			
Flight Simulator (A2-FS1)	D	33.50	26.80
Pinball (A2PB1)	D	29.95	23.95
Graphics Combo Pkg.	D	119.85	95.96
SYNERGISTIC SOFTWARE			
Atlantis	D	40.00	31.95
Higher Text II	D	40.00	31.95
Higher Graphics II	D	35.00	27.95
Nightmare Gallery	D	34.95	27.95
Global Program Line Editor	D	64.95	51.95
★ SYSTEMS PLUS			
TG PRODUCTS			
Game Paddles	A	39.95	31.95
Joystick	A	59.95	47.95
Select-A-Port (5 Way)	A	59.95	47.95
★ TURNKEY SOFTWARE			
★ UNITED SOFTWARE OF AMERICA			
★ VERSA COMPUTING			
VIDEX INC.			
Videoterms (60 hz)	A	345.00	289.95
Enhancer II (Rev 7 & up)	A	149.00	119.95
Function Strip	A	79.00	63.20
VISICORP			
VisiPlot	D	200.00	159.95
VisiTrend/Plot	D	300.00	239.95
VisiDex	D	250.00	199.95
VisiTerm	D	100.00	79.95
VisiCalc 3.3	D	250.00	199.95
VisiFile	D	250.00	199.95
VisiPak	D	700.00	567.95
VisiSchedule	D	300.00	239.95
★ ZEITGEIST			

ATARI

			LIST PRICE	OUR PRICE
ADVENTURE INTERNATIONAL				
Adventures #1-3	32K	D	39.95	31.95
Commbat		D	24.95	19.95
Rear Guard	24K	D	24.95	19.95
Preppie		D	29.95	23.95
War		D	24.95	19.95
Diskey		D	49.95	39.95
ARCADE PLUS				
Ghost Hunter	16K	D	34.95	**24.45‡**
ARcade Pro Football	24K	D	34.95	27.95
★ARTSCI				
ATARI INCORPORATED				
Work Processor	48K	D	149.95	119.95
Personal Finance Mngmt	32K	D	74.95	59.95
Caverns of Mars	16K	D	39.95	31.95
Dow Jones Invest. Eval.	48K	D	129.95	103.95
Microsoft Basic	32K	D	89.95	71.95
Macro Assem & Text Ed	32K	D	89.95	71.95
Mailing List	24K	CT	24.95	19.95
The Programmer Kit	8K	CT	79.85	63.95
The Entertainer Kit	8K	CT	89.95	71.95
Asteroids	8K	CT	34.95	27.95
Assembler Editor	8K	CT	59.95	47.95
Missile Command	8K	CT	34.95	27.95
Centipede	8K	CT	44.95	35.95
Pac Man	8K	CT	44.95	35.95
PILOT (Home Package)	8K	CT	79.95	63.95
Technical User Notes		B	29.95	23.95
Joysticks (Pair)		A	21.95	17.56
Paddles (Pair)		A	21.95	17.56
16K RAM Memory Module		A	99.95	79.95
AUTOMATED SIMULATIONS				
Temple of Apshai	32K	D	39.95	31.95
Crush, Crumble, Chomp	32K	D	29.95	**20.95‡**
★ AVALON HILL GAME COMPANY				
BRODERBUND SOFTWARE				
Apple Panic	48K	D	29.95	**20.95‡**
David's Midnight Magic		D	34.95	27.95
Track Attack		D	29.95	23.95
Star Blazer		D	31.95	25.55
HI-RES Adv. #1 Dead. Sec.		D	34.95	27.95
Choplifter		D	34.95	**24.45‡**
BUDGECO				
Raster Blaster	32K	D	29.95	23.95
CAVALIER				
Bug Attack	16K	D	29.95	23.95
Bug Attack	16K	C	29.95	23.95

			LIST PRICE	OUR PRICE
DATASOFT				
Text Wizard	32K	D	99.95	79.95
Datasm 65 2.0	48K	D	89.97	71.95
Micropainter	48K	D	34.95	27.95
Color Print	40K	D	39.95	31.95
Tumble Bugs	24K	D	29.95	23.95
Graphics Master	40K	D	39.95	31.95
Graphic Generator		D	24.95	19.95
The Basic Compiler		D	99.95	79.95
Canyon Climber	16K	D	29.95	23.95
Shooting Arcade		D	29.95	23.95
Pacific Coast Highway		D	29.95	23.95
Clowns & Balloons		D	29.95	23.95
Le Stick		A	39.95	31.95
Color Print Refill		A	15.95	12.75
DON'T ASK SOFTWARE				
Wordrace	32K	D	24.95	19.95
★ EDU-WARE				
GEBELLI				
Andromeda	24K	D	34.95	27.95
Pathfinder		D	34.95	27.95
Dr. Goodcode's Cavern	48K	D	29.95	23.95
INFORCOM				
Deadline	32K	D	49.95	**34.95‡**
Zork I	32K	D	39.95	31.95
Zork II	32K	D	39.95	31.95
IN-HOME SOFTWARE				
Alien Swarm	16K	D	34.95	27.95
Intruder	16K	D	34.95	27.95
INNOVATIVE DESIGN SOFTWARE				
Pool 1.5	48K	D	34.95	27.95
Pool 400		C	39.95	31.95
JV SOFTWARE				
Action Quest	16K	D	29.95	23.95
★ K-BYTE ★ LJK				
MEGASOFT INC.				
Megalegs	16K	C	34.95	27.95
ON-LINE SYSTEMS				
HI-RES Adv. #0	40K	D	24.95	19.95
HI-RES ADv. #2	40K	D	32.95	26.35
Crossfire	32K	D	29.95	23.95
Mousekattack	32K	D	34.95	27.95
Ultima II		D	59.95	47.95
Jawbreaker	16K	D	29.95	23.95
Threshold	40K	D	39.95	31.95
Softporn Advenure	40K	D	29.95	23.95
The Next Step	32K	D	39.95	31.95
Frogger		D	34.95	27.95

			LIST PRICE	OUR PRICE
Ultima I		D	39.95	31.95
Frogger		C	34.95	27.95
★ OPTIMIZED SYSTEMS SOFTWARE INC.				
PRISM COMPUTERS				
Galactic Chase	16K	D	29.95	23.95
QUALITY SOFTWARE				
Ali Baba and 40 Thieves	32K	D	32.95	**25.35‡**
Assembler	16K	C	24.95	**19.95‡**
ROKLAN CORP				
Deluxe Invaders	16K	D	34.95	27.95
Gorf	16K	D	39.95	**27.95‡**
Wizard of Wor	16K	D	39.95	27.97
Telecom		D	69.95	55.95
Gorf		CT	49.95	39.95
Wizard of Wor		CT	49.95	39.95
SIRIUS SOFTWARE				
Cyclod		D	29.95	23.95
Snake Byte		D	29.95	23.95
STRATEGIC SIMULATIONS				
The Shattered Alliance	48K	D	39.95	31.95
Battle of Shiloh	48K	D	39.95	31.95
Tigers in the Snow	48K	D	39.95	31.95
SUBLOGIC				
Aventure on a Boat	32K	D	24.95	19.95
Black Forest	48K	D	24.95	19.95
SYNAPSE SOFTWARE				
File Manager 800	40K	D	99.95	79.95
Disk Manager	32K	D	29.95	23.95
Dodge Racer	32K	D	29.95	23.95
Protector	32K	D	29.95	23.95
Chicken	16K	D	29.95	23.95
Nautilus	32K	D	29.95	23.95
Slime	16K	D	29.95	**20.95‡**
Protector	32K	C	29.95	23.95
Nautilus	32K	C	29.95	23.95
★ SYNCRO ★ SYNERGISTIC SOFTWARE				
UNITED SOFTWARE OF AMERICA				
Atari World		D	59.95	47.95
3-D Supergraphics	40K	D	39.95	31.95
Survival/Adventure	32K	D	24.95	19.95
VISICORP				
Visicalc	32K	D	250.00	199.95
VERSA COMPUTING				
Graphics Composer	32K	D	39.95	31.95
Globe Master		D	29.95	23.95
Graphics Composer	32K	C	39.95	23.95
VersaWriter Graphics Tablet		A	299.00	239.95

TO ORDER 800-854-2914 • INSIDE CALIFORNIA & ALL OTHER INQUIRIES 1-714-287-0190

SEND FOR OUR FREE CATALOG LISTING ADDITIONAL SOFTWARE FOR ALL MAJOR COMPUTERS.
ALL SOFTWARE OFFERED HAS BEEN EVALUATED FOR PERFORMANCE.
PLEASE CHECK FOR SYSTEM REQUIREMENTS BEFORE ORDERING.
INCLUDE PUBLISHER AND PRODUCT NAME.
PURCHASE ORDERS ACCEPTED • FOREIGN INQUIRIES INVITED — ADD 10% SHIPPING.

All Orders Prepaid by Personal Check, Money Order, Cashier Check.
For Faster Delivery Service — Master Charge — Visa
Mastercharge — Visa, include expiration date on card.
Please Add $2.50 for Shipping.
California Residents Add 6% Sales Tax.

Specials Valid Through This Month's Issue.
Prices Subject to Change Without Notice.

30% DISCOUNT
ON ‡ MONTHLY
SPECIALS

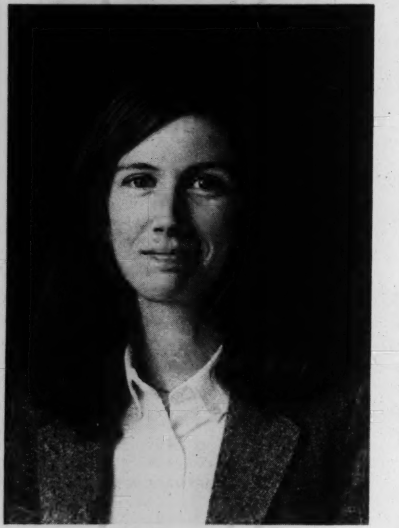
DISCOUNT DATA PRODUCTS

P.O. BOX 19674-CJ • SAN DIEGO, CALIFORNIA 92119

TRS-80·APPLE·ATARI·IBM·XEROX·PET·VI

M·NEC·ET·

CIRCLE 165 ON READER SERVICE CARD



Diane Curtis, TK! Solver Product Manager at Software Arts, Inc.

I brought with me some data on municipal bonds. Basically, I was interested in using the system to compare bonds and do some portfolio calculations. Initially, I called up the "Rule Sheet" and entered two formulae:

A = C*F
Y = A/P

in which:

A = Annual Income
Y = Current Yield
C = Coupon
F = Face Value
P = Purchase Price

I then entered information about a Camden, NJ bond:

P = 13103 (dollars)
C = 5.3 (interest rate)
F = 25000 (purchase price)

Upon pressing ! to solve for the unknown variables, I got the following:

A = 132500 (Annual income)
Y = 10.112188 (Current yield)

Obviously I was not going to get $132500 annual income for the next 13 years on a bond that cost $13103. The problem, of course, was that I expressed percent as 5.3 rather than .053. Well, I want to express percent as 5.3 or 10.1 and not the decimal equivalent so I turned to the unit portion of *TK!Solver*. When the menu showed From and To, I entered the following for C and Y:

From	Pct
To	Dpct
Multiply by	.01

I recalculated but got the same result. Since this didn't help, I was tempted to change the formulas. However the Variable Status Sheet contained the clue to the dilemma. I simply wanted to display a different unit than my calculation unit. So I entered the following:

Display Unit	pct
Calculation Unit	dpct

Now, when I pressed ! to recalculate the table, I found that:

A (annual income) = $1325
Y (current yield) = $10.112188

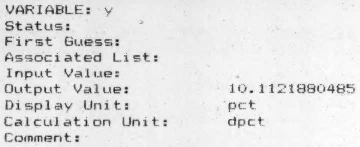
Much more reasonable! But frankly I didn't like the 10.112188; good grief, who needs that many significant digits? However, *TK!Solver*, unlike *VisiCalc*, does not have a formatting capability. The solution was to enter another rule (formula) that stated:

yld = (int (10000 * y))/10000

Of course, I had to enter the unit table and define display (pct) and calculation (dpct) units for "yield" as I had for C and Y.

At this point the screen appeared as shown in Figure 2. As I entered the rules, the program automatically entered the variables in the same order as they appeared in the equations.

This wasn't too tidy, so using the Move command (/M), I moved the rows around. Also, using Delete (/D), I deleted Y since Yld showed the same thing. When I say deleted that does not mean it is gone—after all, it is a vital variable in the equations—but it is no longer displayed in the variable table. To reassure myself that it still existed, I called up the variable sheet for Y and found it intact (see Figure 3).



```
VARIABLE: y
Status:
First Guess:
Associated List:
Input Value:
Output Value:                 10.1121880485
Display Unit:                 pct
Calculation Unit:             dpct
Comment:
```

Figure 3. Variable subsheet for y.

I also added comments and filled out the unit field (with dollar signs). When all this was done, the screen appeared as in Figure 4.

creative computing

SOFTWARE PROFILE

Name: TK! Solver

Type: Model building and solving tool

System: Many computers

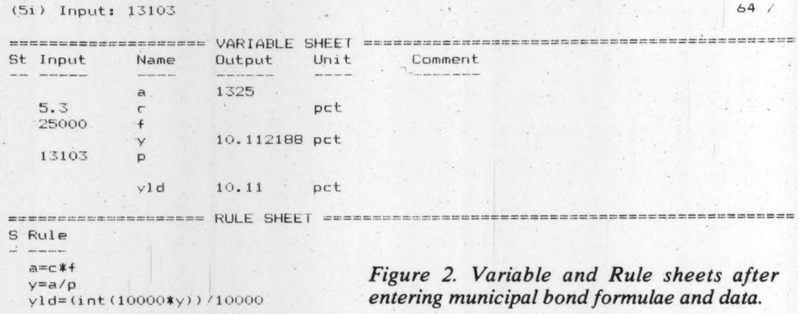
Format: Disk

Language: Machine language

Summary: Easy to learn and use; wide variety of applications

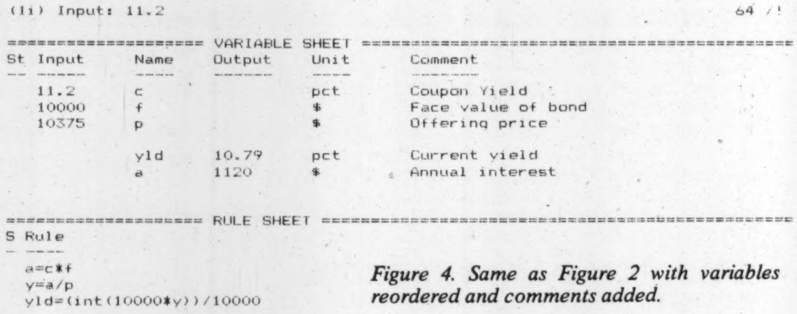
Price: $299 for TK! Solver; $50 to $100 for applications packs

Manufacturer:
Software Arts, Inc.
675 Massachusetts Ave.
Cambridge, MA 02139



```
(5i) Input: 13103                                                    64 /

==================== VARIABLE SHEET ====================================
St Input      Name    Output     Unit      Comment
-- -----      ----    ------     ----      -------
              a       1325
   5.3        c                  pct
   25000      f
              y       10.112188 pct
   13103      p

              yld     10.11      pct

==================== RULE SHEET ========================================
S Rule
- ----
  a=c*f
  y=a/p
  yld=(int(10000*y))/10000
```

Figure 2. Variable and Rule sheets after entering municipal bond formulae and data.



```
(1i) Input: 11.2                                                     64 /!

==================== VARIABLE SHEET ====================================
St Input      Name    Output     Unit      Comment
-- -----      ----    ------     ----      -------
   11.2       c                  pct       Coupon Yield
   10000      f                  $         Face value of bond
   10375      p                  $         Offering price

              yld     10.79      pct       Current yield
              a       1120       $         Annual interest

==================== RULE SHEET ========================================
S Rule
- ----
  a=c*f
  y=a/p
  yld=(int(10000*y))/10000
```

Figure 4. Same as Figure 2 with variables reordered and comments added.

MING CHALLENGES YOU TO SURVIVE!

MING'S
challenge

Ming... Evil incarnate, a hellish entity who by comparison makes Hitler, Stalin, Tiberius, Torquemada, Ivan the Terrible, and the Devil himself look like candystripers... challenges YOU to survive! Think it's easy? Consider:

- You sit, fingering the *kill* button, in your small spaceship at the bottom of the screen.
- Suddenly Ming directs Deathships straight at your fragile craft.
- Next the Claymen, at a signal from Ming, hurtle bombs at you.
- You can neutralize Ming's Deathships by shooting them and placing them in suspended animation.
- Cyclops drop bombs on you and freeze the Deathships, making them disappear into hyperspace (making you lose points).
- If you do not place Deathships into suspended animation they will vanish into the Black Hole and you will lose points.
- Greater perils and varying challenges await you and only the truly TOP game players will survive MING'S CHALLENGE.

As a player, you enjoy the option of altering the parameters endlessly ... changing speed of the game, number of enemies, width and depth of the Black Hole. Also, if you are the first to survive MING'S CHALLENGE, you will receive either the next 10 games produced by MICROFUN, free of charge, or any single business product presently available from MICROLAB.

This Program was Written by Mike Livesay
Available now at your local dealer
CIRCLE 215 ON READER SERVICE CARD

micro fun™
entertainment division
of micro lab

MING'S CHALLENGE plays on
Apple II, 48K
APPLE is a registered trademark of Apple Computer, Inc.

YOUR PROGRAM HERE

IBM

The best software for the IBM Personal Computer. Could it be yours?

Attention, all programmers. Here's a chance to reach the top.

If you've written software that's completed and runs on the IBM Personal Computer, we could be interested in publishing it.

(We also could be interested if it runs on *another* computer. If we select your software, we'll ask you to adapt it to our system.)

But be advised.

Our expectations are great.

Because the software we publish must be good enough to complement IBM Personal Computer hardware. In fact, the more you take advantage of all our hardware capabilities (see the box at right), the more interested in your software we become.

Think about incorporating color graphics into your program, for example.

Use sound. Consider the power of our keyboard and remember to utilize the ten programmable function keys.

In all cases, we're interested in "friendly" software—with emphasis on quality and wide appeal. Programs with the greatest chance of being published must be easy to use, offer a better way to accomplish a task and provide something special to the user.

What kinds of programs? All kinds.

Education. Entertainment. Personal finance. Data management. Self improvement. Games. Communications. And yes, business.

We select programs that will make the IBM Personal Computer an even more useful tool for modern times.

IBM PERSONAL COMPUTER SPECIFICATIONS

User Memory
16K-512K bytes*
Microprocessor
16-bit, 8088*
Auxiliary Memory
2 optional internal diskette drives, 5¼", 160K bytes or 320K bytes per diskette
Keyboard
83 keys, 6 ft. cord attaches to system unit*
10 function keys*
10-key numeric pad
Tactile feedback*
Diagnostics
Power-on self testing*
Parity checking*

Display Screen
High-resolution*
80 characters x 25 lines
Upper and lower case
Green phosphor screen*
Operating Systems
DOS, UCSD-p System, CP/M-86†
Languages
BASIC, Pascal, FORTRAN, MACRO Assembler, COBOL
Printer
Bidirectional*
80 characters/second
12 character styles, up to 132 characters/line*
9 x 9 character matrix*

Permanent Memory
(ROM) 40K bytes*
Color/Graphics
Text mode:
16 colors*
256 characters and symbols in ROM*
Graphics mode:
4-color resolution: 320h x 200v*
Black & white resolution: 640h x 200v*
Simultaneous graphics & text capability*
Communications
RS-232-C interface
Asynchronous (start/stop) protocol
Up to 9600 bits per second

*ADVANCED FEATURES FOR PERSONAL COMPUTERS

So, if you think your software is the best, consider submitting it. If it's accepted, we'll take care of the publishing, the marketing and the distribution. All you have to do is reap the benefits of our new royalty terms. And you're free to market your program elsewhere *at any time* even if you license it to us.

We're offering the ladder. Think about taking the first step.

For information on how to submit your program, write: IBM Personal Computer,
External Submissions,
Dept. 765 PC, Armonk,
New York 10504.

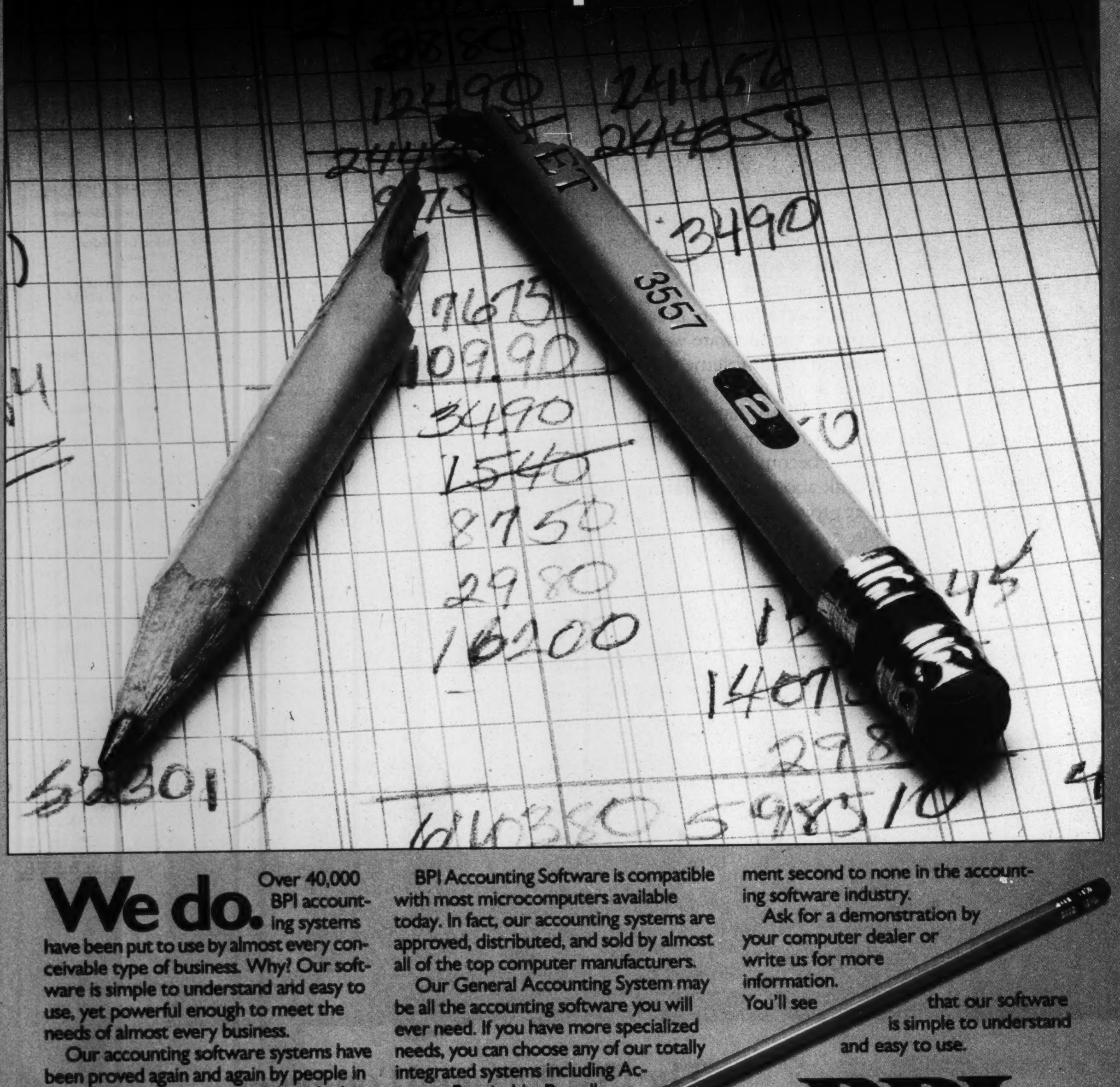
IBM®

The IBM Personal Computer
A tool for modern times

For an authorized IBM Personal Computer dealer near you (or information from IBM about quantity purchases) call 800-447-4700. In Illinois, 800-322-4400. In Alaska or Hawaii, 800-447-0890.
†UCSD p-System is a trademark of the Regents of the University of California. CP/M-86 is a trademark of Digital Research, Inc.

CIRCLE 186 ON READER SERVICE CARD

Who says Accounting is simple?



We do. Over 40,000 BPI accounting systems have been put to use by almost every conceivable type of business. Why? Our software is simple to understand and easy to use, yet powerful enough to meet the needs of almost every business.

Our accounting software systems have been proved again and again by people in all walks of life. And most of them had no previous computer experience.

With some accounting software, if you have questions, getting answers can be difficult or even impossible.

BPI Systems has a service department as close as your telephone. Questions about any of our products will be answered promptly and accurately. Without a service charge to you.

BPI Accounting Software is compatible with most microcomputers available today. In fact, our accounting systems are approved, distributed, and sold by almost all of the top computer manufacturers.

Our General Accounting System may be all the accounting software you will ever need. If you have more specialized needs, you can choose any of our totally integrated systems including Accounts Receivable, Payroll, Inventory Control, Job Cost, Accounts Payable, and Professional Time Accounting. Alone or in combination, they are the easiest to use business accounting systems available today.

BPI Systems offers proven reliability backed by a customer service commitment second to none in the accounting software industry.

Ask for a demonstration by your computer dealer or write us for more information.

You'll see that our software is simple to understand and easy to use.

BPI SYSTEMS

SIMPLY, THE MOST POWERFUL SOFTWARE IN BUSINESS.

3423 GUADALUPE/AUSTIN, TX 78705/512-454-2801

CIRCLE 125 ON READER SERVICE CARD

TK! Solver continued...

Now I could use the model to compare some municipal bonds, at least in a simple sense. I decided to look for maximum current income from a list of bonds offered by a municipal bond dealer. Here is the data from the first four bonds. The last two columns are calculated with my *TK!Solver* model.

Bond	*Coupon*	*Face*	*Price*	*Yield*	*Annual Income*
Mt. Kisco 7/98	10.875	10000	9500	11.45	$1088
Erie County 3/99	5.00	10000	5250	9.52	500
Mass Housing 10/87	2.00	10000	6275	3.18	200
Waterford, CT 6/90	11.20	10000	10375	10.79	1120

Naturally, there is more to comparing bonds than that since capital gains must be considered for the last three bonds. In fact, the total yield to maturity includes the capital gain plus the annual yield from the coupon, but at least I had a good start with *TK!Solver* giving me the yield and annual income from each.

Lists of Data

Instead of immediately going into the more complicated yield-to-maturity calculation, I decided to consider a portfolio summary. In this case, the list was longer, representing a portfolio of bonds accumulated over several years. I simulated this with data for 16 bonds taken from Lebenthal offering lists. Instead of entering data individually, I wanted to enter a list of data, have all the calculations performed *en masse*, and see a list of output values.

To do this, I entered the status area on the Variable Sheet and entered L (for List). To enter a list, you move the cursor over the list name on the Variable Sheet, press the right caret and the blank List appears. (Alternatively, a List can be entered from the List Sheet.) Typing values in order automatically fills in the list.

I then wanted the program to automatically solve my equations for all 16 sets of data I had entered in the lists. This was done by simply entering the list solver (/L) and pressing solve (!). You must have some dummy data in the input variables at this point or *TK!Solver* will just sit there not knowing which are input and which are output variables.

During the solving process, you can display each set of variables in turn on the screen or, for maximum speed, you can turn off the display from the Global Sheet (=G).

When the solving process was done, I called the List Sheet (=L) and, lo and behold, my output variables were now filled with values (see Figure 5).

I now had a fictitious half million dollar municipal bond portfolio in the computer. First I wanted some summary information about it. Here I had a choice: I could enter more rules or use *TK!Solver* as a calculator. I chose the latter approach.

To do this, you go to any value (or numeric) field on any sheet and simply type in the calculation you wish to perform including variables, functions, lists, etc. First, I wanted the sum of the bond face values so I went to an empty field and typed:

SUM ('F)

The apostrophe indicates that all values of the list are to be summarized. In a split second 550,000 appeared. Ah ha, the face value of the portfolio was $550,000 not one-half million. The sum of the purchase price was, $459,899.

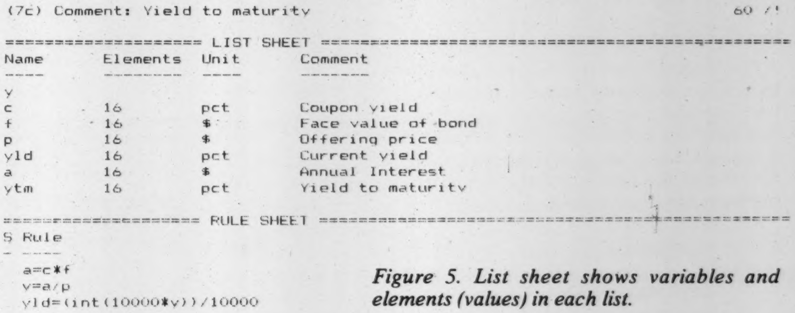
Okay, that was simple. Now for a tough one. I wanted the weighted coupon yield based on the face value and the weighted current yield based on the purchase price. To get this, I would have to multiply each yield by each price, take the sum of these products and divide by the sum of the price. But *TK!Solver* has a solution in the form of a function called DOT. DOT returns the dot product of two specified lists. Each element in the first list is multiplied by the corresponding element in the second list and the products are summed. Hence, my calculation for weighted coupon yield was simply:

DOT ('C, 'F) / SUM ('F)

I found the weighted coupon yield to be 8.69% and the weighted current yield 10.3%. Gee, I wish I had this portfolio.

Plots and Graphs

I next hypothesized that there might be some sort of relationship between current yield, yield to maturity and coupon yield. What better way to look at these than with a plot or graph? So I called the Plot Sheet (=P) and filled in "C" (coupon yield) for the X variable and "Y" (current yield) and "YTM" (yield to maturity) for Y variables. I also specified plot characters Y and M (for yield to maturity). The resulting plot is shown in Figure 6. Municipal bond investors will not be surprised



```
(7c) Comment: Yield to maturity                                        60 /!

==================== LIST SHEET ========================================
Name         Elements   Unit        Comment
----         --------   ----        -------
y
c            16         pct         Coupon yield
f            16         $           Face value of bond
p            16         $           Offering price
yld          16         pct         Current yield
a            16         $           Annual Interest
ytm          16         pct         Yield to maturity

==================== RULE SHEET ========================================
S Rule
- ----
  a=c*f
  y=a/p
  yld=(int(10000*y))/10000
```

Figure 5. List sheet shows variables and elements (values) in each list.

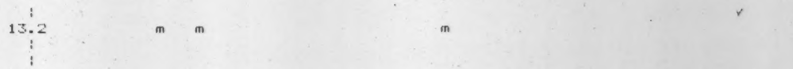
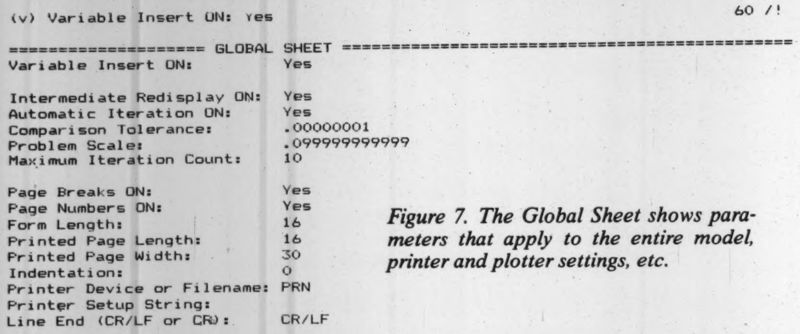


Figure 6. Plot of current yield (y) and yield to maturity (m) against coupon yield. TK! Solver offers many plot options.



```
(v) Variable Insert ON: Yes                                       60 /!

==================== GLOBAL SHEET ==========================================
Variable Insert ON:           Yes

Intermediate Redisplay ON:    Yes
Automatic Iteration ON:       Yes
Comparison Tolerance:         .00000001
Problem Scale:                .099999999999
Maximum Iteration Count:      10

Page Breaks ON:               Yes
Page Numbers ON:              Yes
Form Length:                  16
Printed Page Length:          16
Printed Page Width:           30
Indentation:                  0
Printer Device or Filename:   PRN
Printer Setup String:
Line End (CR/LF or CR):       CR/LF
```

Figure 7. The Global Sheet shows parameters that apply to the entire model, printer and plotter settings, etc.

to see that current yield is directly related to coupon yield, and yield to maturity is inversely related.

From the Global Sheet it is possible to set the output page size. By reducing it, you can automatically scale a graph down if you want to jam it into a smaller space. The Global Sheet is also the place from which printer names and conventions are specified. (See Figure 7.)

Plotting is not limited to the scatter charts produced by *TK!Solver*. Data, variables, units, etc. may be saved on a disk using the DIF (Data Interchange Format) and used in other programs such as *VisiCalc* and *VisiPlot*. Conversely, data from *VisiCalc* may be read into *TK!Solver* from a DIF disk.

Iterative Problem Solving

Not all problems can be solved directly by simply substituting values in formulae. Let's consider a simple problem of a retail business. Say a video game cartridge has a manufacturer suggested list price of $29.95 and the cost is $21.00. We enter the formulae for margin and markup:

ma = (s-c)/s
mu = (s-c)/c

in which:

ma = margin (%)
mu = markup (%)
s = selling price
c = cost

Entering the data above and solving indicates a 29.9% margin and a 42.6% markup (see Figure 8).

But you know from experience that any margin less than 35% is cutting things too close. To make a 35% margin, what should the selling price be? I put 35 in margin as an input and blanked out (/B) the $29.95 selling price. I pressed ! to solve and nothing happened. No longer was output defined by a direct equation.

To solve, I entered a guess (it could be anything, but I put in 30) and, after five iterations, *TK!Solver* indicated that 32.307692 was the selling price required to make a 35% markup (see Figure 9). Now you know why most retailers price video game cartridges at $31.95.

Present Values

The present value of future cash flows are extremely important to all kinds of businesses. Let's say that you can automate a portion of your assembly line for $10,000. Your volume is growing, so you expect this automation to be increasingly important for the next three years, but to drop in Year 4 as product obsolescence is reached. Hence, you expect your cash flow to be as follows:

cf0	-10000	(Cash flow in Year 0 or cost now = $10,000)
cf1	2000	(Cash generated in Year 1 = $2,000)
cf2	3000	
cf3	5000	
cf4	2000	

You put in the following rule (or formula):

pv=npv(rate, cf0,cf1,cf2,cf3,cf4)

If the cash flow values were entered in a list as described above, the rule could also be expressed as:

pv= npv(rate, 'cf)

in which:

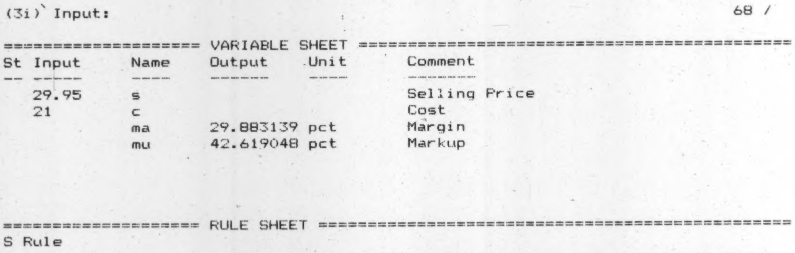
pv = present value
npv = a *TK!Solver* function for calculating net present value
cfn = cash flow in year N

Upon entering this formula, the data above, and 0 for present value, I tried to solve for the rate of return. No go. So I simply put in 1 as my guess for a rate and watched *TK!Solver* iterate to a solution of 7.4%. Pretty poor! I could do better in the money market.

So I put in 20% as my desired rate and blanked out the cash flow in Year 4. *TK!Solver* said I needed $6960 cash flow to make it. Impossible.

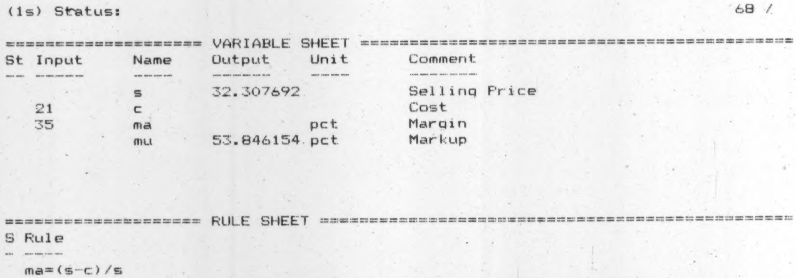
I put back the original cash flows and blanked out the initial investment (cf0) and solved. In this case, it told me I couldn't invest more than $7610 to get a 20% return.

Using this, I could try any number of different scenarios, perhaps entering my data in lists and plotting the various results.



```
(3i)` Input:                                                        68 /

==================== VARIABLE SHEET ========================================
St Input       Name     Output      Unit        Comment
-- -----       ----     ------      ----        -------
   29.95       s                                Selling Price
   21          c                                Cost
               ma       29.883139 pct           Margin
               mu       42.619048 pct           Markup


==================== RULE SHEET ============================================
S Rule
- ----
  ma=(s-c)/s
  mu=(s-c)/c
```

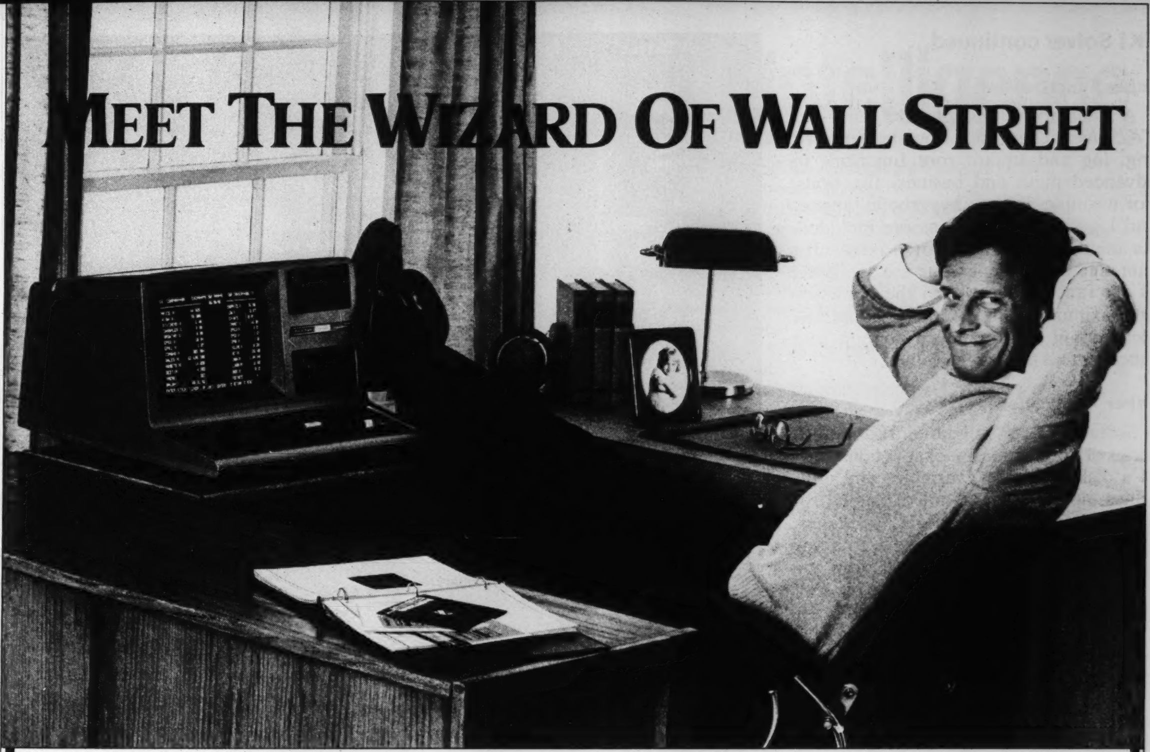
Figure 8. Variable and Rule Sheets for a markup and margins model. Model here solved for margin and markup given selling price and cost.



```
(1s) Status:                                                        68 /

==================== VARIABLE SHEET ========================================
St Input       Name     Output      Unit        Comment
-- -----       ----     ------      ----        -------
               s        32.307692               Selling Price
   21          c                                Cost
   35          ma                   pct         Margin
               mu       53.846154   pct         Markup


==================== RULE SHEET ============================================
S Rule
- ----
  ma=(s-c)/s
  mu=(s-c)/c
```

Figure 9. Same model as Figure 8 except it was used to solve for selling price (iteratively) given cost and desired margin.

MEET THE WIZARD OF WALL STREET



Standard & Poor's STOCKPAK system can turn any investor into a whiz

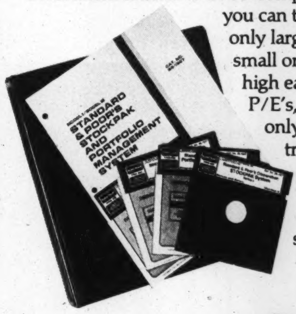
Whether you're an active investor, or just considering the best ways to invest, STOCKPAK can turn you into a Wall Street Wizard.

Sophisticated software that's easy to use

STOCKPAK is a sophisticated software system that offers you an easy and economical way to obtain and evaluate important investment information to help you make better investment decisions. In fact, in virtually no time at all, you can put STOCKPAK to work for you performing a wide range of investment functions.

Screening power is at your command

Our Screen and Select system lets you apply your own investment criteria to a 900-company database. For example, you can tell STOCKPAK to find only large companies, or only small ones...only those with high earnings growth, or low P/E's, or high dividends... only those in certain industries, or on specific exchanges...only those above or below a certain price... or only those with high sales, or low debt, and so on.



In fact, you can draw from over 200 specific information items to compose a single screen. And, you can establish your own targets and cut-off points in each of these 200 areas. STOCKPAK will oblige by searching through the entire database to find only those companies that satisfy your criteria.

More feats of wizardry with STOCKPAK

Standard & Poor's time-tested software also lets you evaluate and manage actual or hypothetical portfolios of up to 100 stocks each. And, you can create your own customized reports—displayed the way you want them.

Whether you use STOCKPAK to help improve your investment decisions, or just for the fun of it, it's good to know the source of this wizardry: Standard & Poor's, one of the world's leading financial publishers with a 120-year reputation of service to the investment community.

Visit your local Radio Shack Computer Store today

STOCKPAK is designed exclusively for use on the TRS-80 Models III and I computers with 32K business systems and two disk drives. The basic software and sample database plus complete documentation is available from your Radio Shack computer store for only $49.95. The STOCKPAK monthly updating service can be ordered directly from Standard & Poor's for only $200 annually. Visit your local Radio Shack today for additional information and a demonstration.

STANDARD & POOR'S CORPORATION
25 BROADWAY, NEW YORK, N.Y. 10004

© STANDARD & POOR'S 1982

CIRCLE 290 ON READER SERVICE CARD

Other Functions

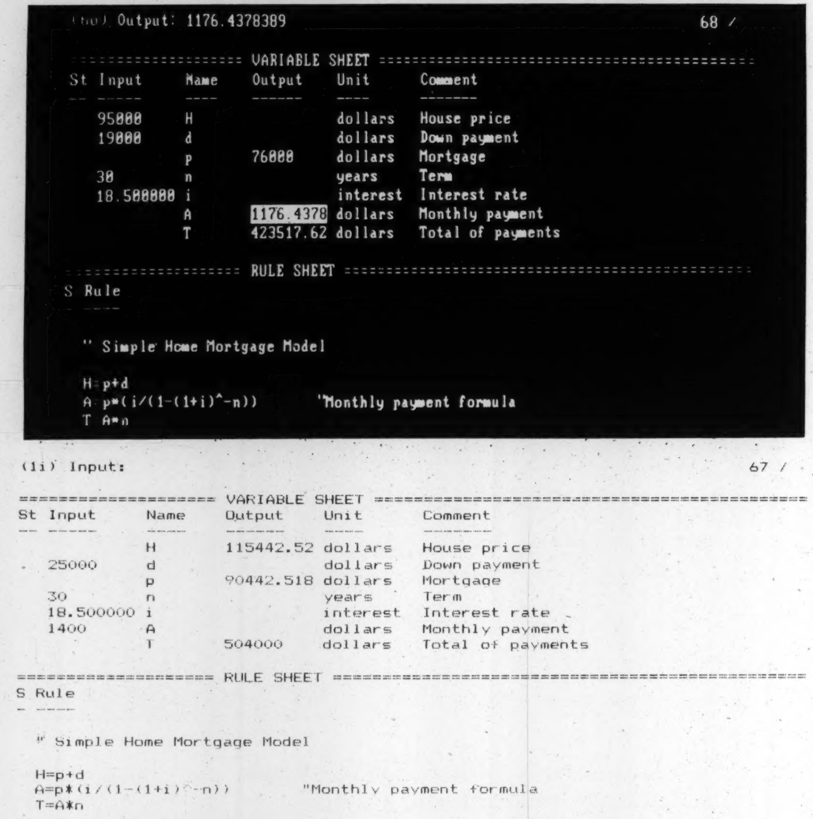
A total of 34 functions are built into *TK!Solver*. They range from the expected trig, log and square root functions to advanced math and business functions. For example, inverse hyperbolic tangent and log base 10 functions are included. As mentioned earlier, dot product, list sum, and net present value are available, as are functions to return the minimum or maximum value in a list, count the elements in a list, or even apply a user function to a domain of values.

Other Applications

Software Arts will be introducing a series of applications packages consisting of a disk with rules, variables and units tables along with a detailed manual for each. Similar to the HP41C packages, these will give instructions for running the package as is but also will show the user how to change it to meet his own requirements.

I tried an early version of the mortgage package and found that a $95,000 house with a 20% down payment and 30-year 18.5% mortgage would cost me $1176 per month. However, if I could scrape together $1400 per month I could reduce the term of the mortgage to 10 years(!) or purchase a $115,000 house (see Figure 10).

Other packages are being prepared for education (a neat population model, among others), civil engineering, mechanical engineering, HVAC, convertible bonds, institutional portfolio management and many more.



```
(6o) Output: 1176.4378389                                          68 /

==================== VARIABLE SHEET =====================================
St Input      Name    Output     Unit       Comment
-- -----      ----    ------     ----       -------
   95000      H                  dollars    House price
   19000      d                  dollars    Down payment
              p       76000      dollars    Mortgage
   30         n                  years      Term
   18.500000  i                  interest   Interest rate
              A       1176.4378  dollars    Monthly payment
              T       423517.62  dollars    Total of payments

==================== RULE SHEET =========================================
S Rule
- ----

  " Simple Home Mortgage Model

  H=p+d
  A=p*(i/(1-(1+i)^-n))          "Monthly payment formula
  T=A*n
```

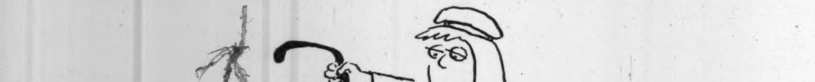
```
(1i) Input:                                                        67 /

==================== VARIABLE SHEET =====================================
St Input      Name    Output     Unit       Comment
-- -----      ----    ------     ----       -------
              H       115442.52  dollars    House price
   25000      d                  dollars    Down payment
              p       90442.518  dollars    Mortgage
   30         n                  years      Term
   18.500000  i                  interest   Interest rate
   1400       A                  dollars    Monthly payment
              T       504000     dollars    Total of payments

==================== RULE SHEET =========================================
S Rule
- ----

  " Simple Home Mortgage Model

  H=p+d
  A=p*(i/(1-(1+i)^-n))          "Monthly payment formula
  T=A*n
```

Figure 10. Screen photo shows mortage model used to calculate number and amount of monthly payments. Below the same model calculates that a $1400 monthly payment would allow buying a house costing $115,442.

The Ultimate Solution?

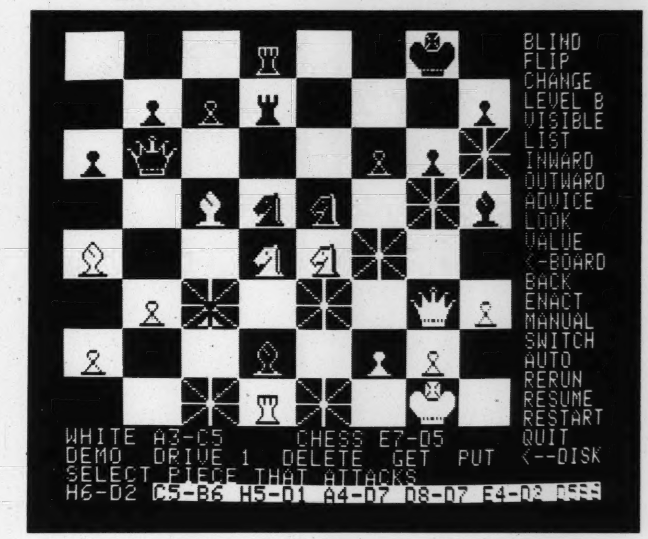
Ever since I attended Software Arts' initial press conference introducing *TK!Solver*, people have asked me, "Is it another *VisiCalc*?"

Frankly, I don't know. It seems that many of the users at which *TK!Solver* is being aimed are already computer literate and are probably using timesharing (with packaged software) or a microcomputer (with self-written programs in Basic). However, both of these groups probably would be more than enthusiastic about a user-friendly tool like *TK!Solver*. It may not sell as many computers as *VisiCalc* has, but it certainly will win as many friends. ☐



Software Arts
TK
☐ Solver

Explore the Frontiers of Intelligence


BLIND
FLIP
CHANGE
LEVEL B
VISIBLE
LIST
INWARD
OUTWARD
ADVICE
LOOK
VALUE
<-BOARD
BACK
ENACT
MANUAL
SWITCH
AUTO
RERUN
RESUME
RESTART
QUIT
<--DISK

```
WHITE A3-C5      CHESS E7-D5
DEMO  DRIVE 1  DELETE  GET  PUT
SELECT PIECE THAT ATTACKS
H6-D2 C5-B6 H5-D1 A4-D7 D8-D7 E4-D[illegible]
```

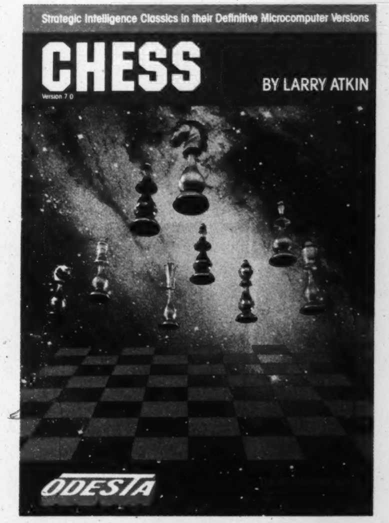
- ◀ Variations of blind-fold play—camouflaged or invisible pieces
- ◀ Invert board to play black on bottom
- ◀ Change pieces on board during game, or set up position
- ◀ Change between 15 levels of play, plus postal and mate-finder modes
- ◀ Show move that **Chess** is thinking about
- ◀ List played moves for each side
- ◀ Lines of force in: attacks and defenses on a square
- ◀ Lines of force out: squares attacked and defended
- ◀ **Chess** suggests a move
- ◀ Show moves **Chess** thinks you will make, and its responses
- ◀ Evaluation of a position
- ◀ Return to board or switch to command menu
- ◀ Take back a move (repeatable)
- ◀ Play move suggested by look-ahead search
- ◀ **Chess** plays neither side
- ◀ Switch sides
- ◀ **Chess** plays against itself—one level against another
- ◀ Replay through most advanced position
- ◀ Skip to most advanced position
- ◀ Start new game
- ◀ Leave program
- ◀ Save, get, and delete games to and from disk

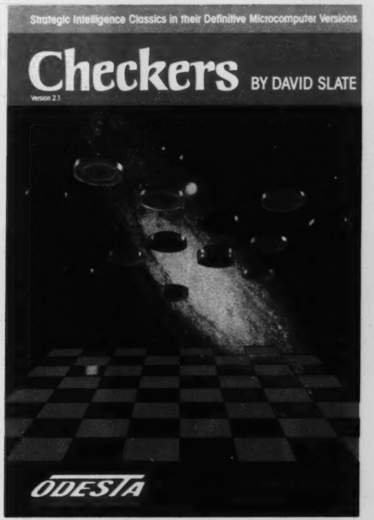
All features self-documented; all choices cursor-controlled
Screen shows "outward" and "look" features being used

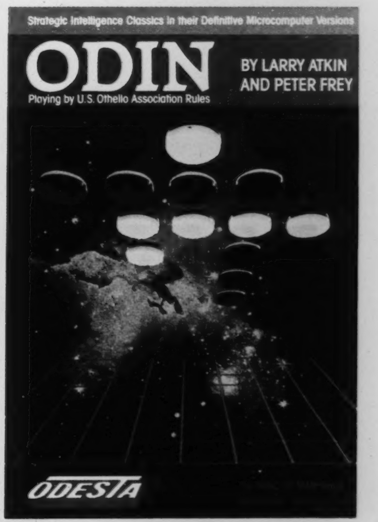
THE PEOPLE BEHIND THE PROGRAMS:

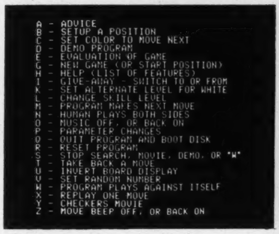
Larry Atkin & David Slate: Authors of the Northwestern University Chess 4.7 program—World Computer Chess Champion, 1977-1980

Peter Frey: Northwestern University professor
Editor: **Chess Skill in Man and Machine**
One of U.S. Othello Assoc.'s top-ranked players


Strategic Intelligence Classics in their Definitive Microcomputer Versions
CHESS
Version 7.0
BY LARRY ATKIN
ODESTA

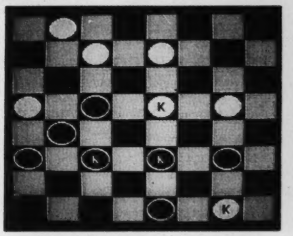

Strategic Intelligence Classics in their Definitive Microcomputer Versions
Checkers
Version 2.1
BY DAVID SLATE
ODESTA


Strategic Intelligence Classics in their Definitive Microcomputer Versions
ODIN
Playing by U.S. Othello Association Rules
BY LARRY ATKIN AND PETER FREY
ODESTA

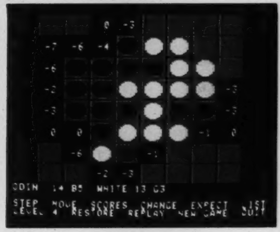


```
A - ADVICE
B - SETUP A POSITION
C - SET COLOR TO MOVE NEXT
D - DEMO PROGRAM
E - EVALUATION OF GAME
G - NEW GAME (OR START POSITION)
H - HELP (LIST OF FEATURES)
I - GIVE-AWAY - SWITCH TO OR FROM
K - SET ALTERNATE LEVEL FOR WHITE
L - CHANGE SKILL LEVEL
M - PROGRAM MAKES NEXT MOVE
N - HUMAN PLAYS BOTH SIDES
O - MUSIC OFF, OR BACK ON
P - PARAMETER CHANGES
Q - QUIT PROGRAM AND BOOT DISK
R - RESET PROGRAM
S - STOP SEARCH, MOVIE, DEMO, OR "W"
T - TAKE BACK A MOVE
U - INVERT BOARD DISPLAY
V - SET RANDOM NUMBER
W - PROGRAM PLAYS AGAINST ITSELF
X - REPLAY ONE MOVE
Y - CHECKERS MOVIE
Z - MOVE BEEP OFF, OR BACK ON
```

Checkers' features

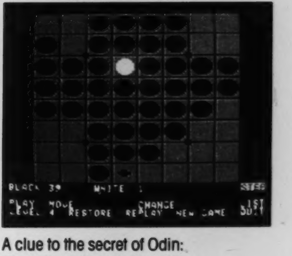


Black to move and win
(From Checkers documentation)


0
-3
-7
-6
-4
-6
-2
-3
-3
-3
0
0
-1
0
-6
-1
-2
-3

```
ODIN  14 B5  WHITE 13 G3
STEP  MOVE  SCORES  CHANGE  EXPECT  LIST
LEVEL 4  RESTORE  REPLAY  NEW GAME  QUIT
```

"Scores" feature in Odin



```
BLACK 39     WHITE 1                STEP
PLAY  MOVE          CHANGE          LIST
LEVEL 4  RESTORE  REPLAY  NEW GAME  QUIT
```

A clue to the secret of Odin:
Black is destined to lose.

ODESTA

930 Pitner
Evanston, IL 60202
(U.S.A.)

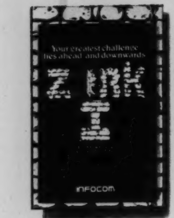
Chess: $69.95
Checkers: $49.95
Odin: $49.95

See your local software dealer, or order (Mastercard or Visa):
800-323-5423
(in Illinois, call 312-328-7101)

For **Apple II, Apple II Plus 48K** disk systems, and **Atari 48K** disk systems. Odin is also available for **TRS-80 Model 1 & 3 32K** disk systems.

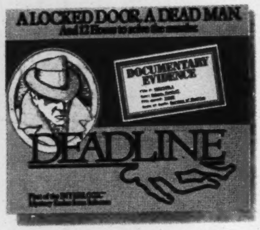
CIRCLE 233 ON READER SERVICE CARD

©1982 ODESTA


Your greatest challenge lies ahead and downwards
ZORK I
INFOCOM

The next step downward to danger
ZORK II
INFOCOM

It all comes down to this.
ZORK III
INFOCOM


A LOCKED DOOR. A DEAD MAN.
And 12 Hours to solve the murder.
DOCUMENTARY EVIDENCE
DEADLINE

STARCROSS
INFOCOM

WE'RE WRITING

THEM AS FAST AS WE CAN!

At the rate we're going, we'll have these pages filled by 2083. And by 2084, people will be clamoring for the next Infocom creation.

We hate to disappoint our public. So we keep you waiting. Because while the software factories are cranking out arcade game after arcade game, pulpy adventure after trite fantasy, we're writing and rewriting, honing and perfecting. Before a single person enters one of Infocom's worlds, it must be crafted into a living, riveting, definitive experience.

Judging from the public's reaction, it's worth the wait. For instance, *Creative Computing* welcomed DEADLINE™ as "thoroughly engrossing and realistic," while a *Softalk* readers' poll recently voted ZORK™ I and ZORK II the most popular adventures of 1981.

And now, for the moment, your wait is over. ZORK III, your final step in the underground trilogy, and STARCROSS,™ an exploration of a new dimension in science fiction, are ready for you.

Look at them up there, the little worlds of Infocom. As our universe expands, companions will come to help fill that vast expanse of white space. Till then, they'll continue to stand alone as the best of all possible worlds.

INFOCOM™
55 Wheeler Street, Cambridge, MA 02138

Infocom's worlds are available for Apple,® Atari,® IBM, TRS-80,® Commodore, NEC, Osborne, CP/M,® and DEC.™

Apple is a registered trademark of Apple Computer, Inc. Atari is a registered trademark of Atari, Inc. TRS-80 is a registered trademark of Tandy Corporation. CP/M is a registered trademark of Digital Research, Inc. DEC is a trademark of Digital Equipment Corporation.

MatheMagic

Computation Made Easy

Brian J. Murphy

International Software Marketing may be onto something big in *MatheMagic*, a program which turns your computer into a powerful calculator with many possible applications in technical, scientific and academic settings.

The Apple II version we saw, written in Applesoft Basic by Joe Luciano, loads from one disk drive, although the user manual points out that a data disk is required and that the program is more easily run when two drives are available.

MatheMagic is not a VisiCalc style spreadsheet program but a tool for turning the Apple into a programmable calculator. When you think about it, microcomputers are called upon to do many chores, such as compiling information, storing and retrieving data, sorting files, and executing commands to a variety of peripheral devices, but they are seldom used to *compute*—to do mathematical chores. With *MatheMagic*, a new era begins.

In simple terms, what *MatheMagic* does is to create files of formulas which the user can store on separate data disks for retrieval as needed. *MatheMagic* then solves mathematical problems using these retrieved formulas. It sounds simple enough, but there is a world of possible applications for *MatheMagic*.

Let's take a closer look at the program. As the documentation says, you are better off with two disk drives because you work with a program disk and one or more data disks which are used for storing the formulas you create and save. The data disks are initialized in the usual way.

Once you have your disk initialized, relax; the program manual and the program itself give you appropriate cues when it is time to switch disks in your single drive. Users with two drives will find that the switching is automatic.

Brian J. Murphy, 133 Post Road, Fairfield, CT 06430.

All command options are displayed on screen menus. The first menu offers the housekeeping options. You can decide which slots are to be used for the drives, how many drives are to be used, which user will operate the program, whether to have a floating decimal, and whether to print hard copy.

The next task is to create formulas. Before we discuss that, however, let's digress and discuss applications. After all, the formulas you write depend on your own personal or business needs. Stop here. If, by now, you can't think of any computations you would like *MatheMagic* to do for you, or if the ones you think of are as easily done on a $12 calculator, you probably don't need *MatheMagic*.

If on the other hand, you do the same calculations over and over again, or if you frequently solve complex equations, *MatheMagic* can be a godsend. Certainly architectural engineers, electronics experts, statisticians, and other professionals in technical fields will find the program of great potential value. Theoretical scientists will also find abundant applications for *MatheMagic*, although the program is not equipped to do calculus.

Educators and parents may also find *MatheMagic* quite useful. Teachers will find that it is a painless way to get students to think mathematically as they create formulas, test them, and store them in their own files. Parents may also find the program useful in turning the Apple II into a learning tool that can re-ignite the interest of a child who has been "turned off" to math in school.

Now we must ask, how difficult is it to create and save files of formulas with *MatheMagic*? The answer is that it is not too difficult, but to use the program effectively takes a little practice. The major functions of *MatheMagic* are run from a "Formula Menu" from which the user creates the formulas, edits them, saves or loads them through the disk system, and performs the calculations.

There is a small glossary of symbols and abbreviated commands which stand for *MatheMagic* functions. These include the standard Apple II symbols for the basic operations, such as / for division, and * for multiplication.

For more complex functions there are three-letter codes which seem fairly log-

creative computing
SOFTWARE PROFILE

Name: MatheMagic

Type: Calculation program

System: 48K Apple II with
Applesoft, NEC PC-8000,
IBM PC, CP/M based
systems, and at least one
disk drive

Format: Disk

Language: Applesoft or Microsoft
Basic

Summary: Calculator for scientific,
academic, and
technical applications.

Price: $89.99

Manufacturer:
International Software
Marketing
Suite 421, University Building
120 E. Washington St.
Syracuse, NY 13202

ically derived. A few of them are LOG for common log, TAN for tangent, SQR for square root, and DEC for the decimal value of a hex number. Variables can be signified in your formulas by any combination of letters up to 30 characters long.

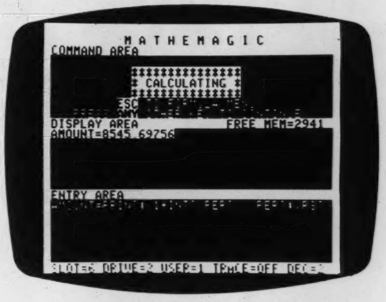
For example, in a suggested mileage calculation formula, *MatheMagic* recommends that you subtract a variable called MILESTHEN from a variable called MILESNOW and divide the result by GAS for gallons. The formula you type in looks like this:

(MILESNOW-MILESTHEN) / GAL

The result, once you give the CALCULATE command is your miles per gallon.

If it occurs to you that you don't have to express the formula more algebraically (X = (a - b)c) you have grasped one of the major advantages of using *MatheMagic*. When you call up your MPG formula it might take a little time to figure out which of the expressions in X = (a - b)c is supposed to be gallons, which old miles and so forth. Using the *MatheMagic* system there is no such confusion.

MatheMagic can also handle arrays of formulas and functions. For example, if you have a formula for the Pythagorean Theorem under the name @PYTH, and you want to find a number that is five times the result of the formula, you input 5*@PYTH and the computer calls up the formula, asks for the values of the variables, and instantly gives you a result multiplied by five.



```
          M A T H E M A G I C
COMMAND AREA
          ****************
          * CALCULATING *
          ****************
        ESC
DISPLAY AREA                FREE MEM=2941
AMOUNT=8545.69756
ENTRY AREA
SLOT=6 DRIVE=2 USER=1 TRACE=OFF DEC=
```

Similarly, you can combine formulas for more sophisticated calculations. This is one of the more appealing facets of *MatheMagic*. It works like this: suppose, for example, you have a formula which determines the number of units you can manufacture in a given span of time. You can create this formula with *MatheMagic* and save it under the name UNIT.

Suppose now you want to write a program which calculates unit costs. You can do so, saving it under the title COST. Now, if you want to figure out how many units you can make and the total cost involved, you do so by commanding @UNIT * @COST.

If you have another formula to calculate shipping costs, you can command @UNIT * @COST + @SHIP. If you want to consider three production runs, you command 3 * (@UNIT * @COST + SHIP). If you plan to use these formulas frequently, you save them under one title, such as @PROD. Every time you call up @PROD, you get @UNIT * @COST + @SHIP.

The potential for combining and recombining your most frequently used formulas is almost unlimited. You can create formula libraries swiftly, and handle the variables easily, thanks to the logical system of naming them with words. When you are through you can get a full-size sheet of hard copy from your serial or parallel printer, instead of cramped figures from a calculator tape which must be copied onto a larger format.

Improvements to *MatheMagic* are currently in the works. The most important of these are adaptations so that the program will work even more efficiently with hard disk retrieval systems. The version we evaluated was designed for a 48K Apple II. *MatheMagic* is also available for the IBM Personal Computer and CP/M systems. Versions for Radio Shack and Atari computers are said to be in the works. ☐

CIRCLE 346 ON READER SERVICE CARD

"Simply the best word processor...anywhere"

For the Apple™

No hardware additions needed — What you see is what you get. All functions are displayed on the screen exactly as they appear in print including:

- Underlining
- Bold
- Superscript
- Even normal justification
- Lower and upper case
- Block movement
- Global replace
- Plus many more features

"Word Handler is simply the best word processing software I could find anywhere by far.
William R. Moroney
President
Electronic Funds
Transfer Association

Now Available!
List Handler
A mailing list program to work with the Word Handler (interfaces with VisiCalc™ and DB Master™) stores up to 3000 records per disk, unlimited sorting fields.

Word Handler

Once you buy a Word Handler we don't forget you: our customer service department is available daily. We support our products.

When upgrades are introduced you are supplied with a replacement disk FREE! Contact your local Apple™ dealer for a demonstration. You'll be glad you did.

Silicon Valley Systems, Inc. 1625 El Camino Real #4 Belmont, CA 94002 (415) 593-4344

Silicon Valley Systems

CIRCLE 273 ON READER SERVICE CARD

AN ATARI 800™ HOME COMPUTER AND A FATHER'S LOVE COMBINED TO HELP CHILDREN EVERYWHERE.

MY FIRST ALPHABET
With Love To My Son
STEVE

Fernando Herrera became the first grand prize winner of the ATARI Software Acquisition Program (ASAP) competition because he believed in computers, his son and himself.

The story of Herrera's success began with his son's sight problems. Young Steve Herrera had been born with severe cataracts in both eyes and, naturally, his father was concerned. Herrera reasoned that the boy's learning abilities could be seriously affected by growing up in a world he could not see.

Having just purchased an ATARI 800 Home Computer, it occured to Herrera that this could be the perfect tool for testing Steve's vision. So he wrote a program simply displaying the letter "E" in various sizes.

Success! It turned out that 2-year-old Steve could see even the smaller "E's" without special lenses. Herrera was first relieved, and then intrigued when he discovered that not only could his son see the "E's," but he would happily play with the computer-generated letters for hours. So Herrera added a picture of an elephant to go with the "E," and then more letters and pictures. Thus, "My First Alphabet" was born, a unique teaching program for children two-years and older consisting of 36 high resolution pictures of letters and numbers.

Herrera submitted the program to the ATARI Program Exchange, where it became an instant best-seller. ATARI was so impressed with the outstanding design, suitability and graphic appeal of "My First Alphabet," that the program is being incorporated into the ATARI line of software.

In addition to his grand prize winnings of $25,000 in cash and an ATARI STAR trophy, Herrera also automatically receives royalties from sales of his program through the ATARI Program Exchange.

But Fernando Herrera wasn't the only software "star" that ATARI discovered. Three other ATARI STARS were awarded at the ASAP awards ceremony for software submitted to the ATARI Program Exchange and judged by ATARI to be particularly unique and outstanding.

Ron and Lynn Marcuse of Freehold, New Jersey, teamed up to write three winning entries in the Business and Professional category for home computers: "Data Management System," "The Diskette Librarian" and "The Weekly Planner."

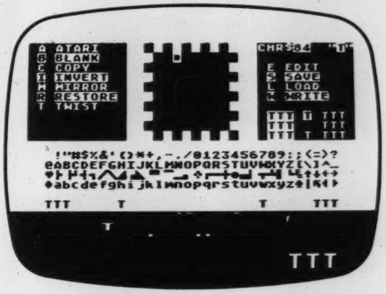
Sheldon Leeman of Oak Park, Michigan, captured an ATARI STAR for his exceptionally well-engineered "INSTEDIT" character set editor.

Greg Christensen of Anaheim, California, became our youngest ATARI STAR winner at the age of 17. Christensen designed the clever "Caverns of Mars" game program, which also will be incorporated into the ATARI product line. Greg designed the program in 1½ months after owning his ATARI Home Computer for less than a year.

Every three months, ATARI awards ATARI STARS to the writers of software programs submitted to the ATARI Software Acquisition Program and judged first, second and third place in the following categories: Consumer (including entertainment, personal interest and development); Education; Business and Professional programs for the home (personal finance and record keeping); and System Software.

Quarterly prizes consist of selected ATARI products worth up to $3,000, as well as an ATARI STAR, plus royalties from program sales through the ATARI Program Exchange. The annual grand prize is the coveted ATARI STAR trophy and $25,000 in cash.

To be eligible, your software idea must be accepted by the ATARI Software Acquisition Program. Your program can have a broad application or serve a very specific purpose.



CAVERNS
OF
MARS

After submittal, consultation from ATARI is available if you need personal assistance with sound, graphics, or other technical aspects of your program.

To make your job easier, ATARI provides some 20 software development tools through the ATARI Program Exchange. A list and description of the various system software is published quarterly in the ATARI Program Exchange Catalog. These tools enable you to utilize all the ATARI resources and software, including the six ATARI programming languages.

Fernando Herrera had a great idea that made him a star. ATARI would like to give you the same opportunity.

ATARI®

A Warner Communications Company

Enter the ATARI ASAP competition and you could win $25,000 in cash, royalties, some great prizes and an ATARI STAR.

SUBMIT TO: ATARI® Software Acquisition Program
Dept. C3R, P.O. Box 427
155 Moffett Park Dr., B-1
Sunnyvale, CA 94086

OR CALL: 800-538-1862; in California, 800-672-1850.

I'm reaching for the stars. Please send me an entry form today.

Name____________________

Address____________________

City____________________

State/Zip____________________

ATARI HOME COMPUTERS

We've Brought The Computer Age Home.™

©1982 ATARI, Inc.

CIRCLE 115 ON READER SERVICE CARD

ISM Software: IT FIGURES!

MatheMagic™

Solutions Without Programming
...the friendly, menu-driven software that provides solutions without programming. From simple calculations to sophisticated mathematics, MatheMagic is infinitely useful in business, classrooms, laboratories or the home. Effectively eliminates the programming gap between user and computer.

Easy to learn...easy to use...in normal math notation. Priced under $100.

GRAPHMAGIC™

Draw Your Own Conclusions
...once you've reached the solutions without programming, GRAPHMAGIC lets you draw your own conclusions. Mastered in minutes, it creates representational charts and graphs from mathematical data. Ideal for classroom or business presentations. Allows ample text anywhere on graphs.

Operates fully stand-alone and is also compatible with MatheMagic™, VisiCalc™ or any DIF™ file product...stores and recalls data from disks...utilizes full color capability... overlays graphs...supports the most popular printers...and is universally affordable at under $100.

PRISM

A Fantasy To Treasure
...this Storydisk™ from ISM brings literature to the microcomputer. PRISM, the first in the Storydisk series, is a fascinating story of heroes, villains and treasure! Lavishly illustrated in full color and animated graphics, with vivid sound effects, it has irresistable appeal for all age groups. PRISM involves the search for three very real, solid gold keys valued at thousands of dollars hidden within the continental United States that may be retrieved by solving the puzzles and riddles in the story. Finders keepers!

A puzzle for all ages...contains simple to complex clues...utilizes the powers of the computer to entertain as well as challenge... priced between $19.95 and $24.95 (depending upon computer model).

MatheMagic is available on: Apple II, IBM PC, CP/M and NEC PC 8000. Coming soon on TRS-80 Models I and III. GRAPHMAGIC is available on: Apple II and II+. Coming soon on IBM PC and NEC PC 8000. PRISM is available on: Apple II, Atari 400/800 Disk and Atari 400/800 Tape.

VisiCalc is a registered trademark of VisiCorp.
DIF is a trademark of Software Arts, Inc.
Apple II and II+ are registered trademarks of Apple Computers, Inc.
IBM PC is a registered trademark of International Business Machines Corp.
CP/M is a registered trademark of Digital Research, Inc.
NEC PC 8000 is a registered trademark of Nippon Electronics Co.
Atari is a trademark of Atari, Inc. a Division of Warner Communications.

See MatheMagic, GRAPHMAGIC and PRISM at your favorite software dealer's or computer store. If they are not available, ask your dealer to contact us. You may also write or call us directly for complete information on all ISM products at:

ism
International Software Marketing
Suite 421, University Building
120 E. Washington Street
Syracuse, New York 13202
(315) 474-3400

683 Armadale Road
Feltham, Middlesex TW14-OLW
England
01-751-5791

CIRCLE 192 ON READER SERVICE CARD

PFS: Graph

Charts and Graphs from an Apple Computer

David H. Ahl

PFS:Graph is a software package for making line, bar and pie charts with an Apple II computer. The minimum system configuration is a 48K Apple II, one disk drive (two are preferable) and, according to the manual, an optional printer or plotter. For reasons discussed below, I felt the printer (or plotter) should not be listed as optional but rather as mandatory.

A functional block diagram of the *PFS:Graph* system is shown in Figure 1.

Six Basic Functions

In the Enter/Edit data section, you can either enter data directly from the keyboard or retrieve data from a *VisiCalc* DIF file or PFS file. X axis data may be in one of three formats: numeric, identifier (labels), or date (month, day, year, quarter, etc.). Y axis data is always numeric.

Function 2 displays a chart or graph.

Function 3, Define Chart, changes the way *PFS:Graph* displays your chart and lets you add explanatory information to it. You can display your graph as a bar, line or pie graph. You can stack individual graphs on top of one another or show them comparatively, side by side.

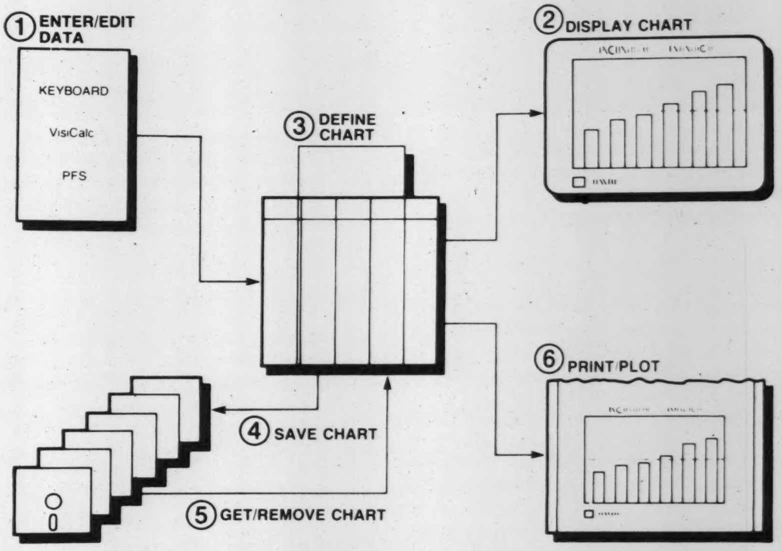


Figure 1. Block diagram of PFS: Graph.

creative computing
SOFTWARE PROFILE

Name: PFS: Graph
Type: Charting and graphing package
Authors: Sebessi Chin and Stephen Hill
System: 48K Apple, disk drive, printer
Format: Disk
Summary: Bar, line and pie charts for up to four variables
Price: $125
Manufacturer:
Software Publishing Corp.
1901 Landings Dr.
Mountain View, CA 94043

Functions 4 and 5 are used to save charts on to disk and to retrieve them again.

Finally, using Function 6, Print/Plot, you can print your chart with a printer or plotter.

PFS:Graph is a menu-driven system. It always comes up with the main graph menu displayed. From this menu, any one of the six functions illustrated in Figure 1 may be selected. To give you some experience playing with the system before making your own graphs, a disk, which contains a wide variety of graphs and charts, is included. The introductory section of the tutorial manual is devoted to getting operational with the system and familiarizing yourself with the functions using the sample charts.

The balance of the manual is divided into six chapters, each of which describes in detail one of the six functions. The manual also includes four appendices which list and explain the error messages, provide a quick reference summary of the whole system, and provide information on using various printers and plotters.

Entering and Editing Data

Upon selecting Get/Edit Data on the main menu, a second menu is displayed which asks whether you wish to enter or edit data from the keyboard, get a *VisiCalc* file, or get a PFS file. If data are to be entered from the keyboard, the screen is divided into two columns, one labeled "X data" and the other labeled "Y data." The first thing you must do is tell *PFS: Graph* what kind of X data are going to be entered: identifier, numeric, or date.

An identifier is simply a collection of characters that identifies something, such as a department name, product name, or product number. These names may be up to fifteen characters long.

Numeric data may be integer or decimal numbers ranging from 10^{-30} or 10^{30}. They may be entered as "standard" numbers or in scientific notation, for example, 1E6 or 1E-5.

Dates can consist of up to three groups of digits that are separated by non-numeric characters. Some examples of acceptable dates are:

12/10/81	3 10 80	2:9:82
12/81	3 80	2:82
12	1980	82

Date format may specify days, months, quarters, years or any legitimate combination of more than one variable such as YM for months of more than one year. The first graph I put in charted data from April 1981 to March 1982. I used the month format and entered the data in the order that I expected it to be plotted. However, because I had not specified different years, *PFS:Graph* assumed I was entering data out of order, and obligingly reordered it for me, which, unfortunately, was not at all what I wanted. This was easily corrected by changing to the combined YM(year month) format.

You can enter up to 36 pairs of X and Y values (only 16 if X is an identifier). If you make a mistake while you are entering data, the cursor control keys may be used to move the cursor to the incorrect value, which may be typed over to make the correction. Thus, the system is somewhat similar to a memory mapped word processing system. This is in contrast to *VisiCalc* or *VisiPlot* which allow you to jump from one value to another using the arrow keys. In *PFS:Graph* only the forward arrow key jumps to the next value. If you wish to jump back, you must use cursor control keys which move only one space at a time.

When all the data for a graph have been entered, you press CONTROL-C to continue. Indeed, *PFS:Graph* uses CONTROL-C in place of RETURN throughout to indicate that data are being entered to the computer. We understand the reason for this: it is all too easy to press RETURN to enter data and then suddenly realize that you weren't really ready to do so. CONTROL-C requires much more deliberation. On the other hand, after a while, having the two keystrokes required to enter practically anything became rather annoying.

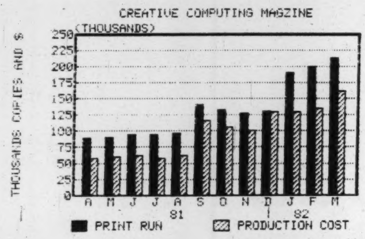


Figure 2. A maximum of 36 bars can be displayed or plotted. This figure shows 24.

As soon as you have entered your data, you may go back to the main menu and ask to see it displayed. You need specify no display parameters, formats, or labels. *PFS:Graph* takes care of everything automatically, at least in a rough way. You may want to make your graph prettier before printing it out, but at least you can see what it looks like as you go along. We found this a big advantage compared to *VisiPlot* which requires several minutes between the data entry function and the graphing function.

If you have much data in *VisiCalc* files you probably want to use the direct entry capability rather than retyping these data. The *VisiCalc* file must be stored in the DIF format. Also, I found it worthwhile to select just that portion of the *VisiCalc* file that I wanted to graph and make a new file containing that data. This avoids the problem of selecting data from a much larger *VisiCalc* file which, in *PFS:Graph*, is a somewhat cumbersome operation.

Let me emphasize that you must know the format of the *VisiCalc* files before trying to read them into *PFS:Graph*. The *PFS:Graph* program will not read a file and then let you examine it for those elements that you wish to plot. Rather, you must specify at the time of reading the data the number of the row (or column) that will provide the X data and the same for the Y data. You must also know the format of the X data. If your *VisiCalc* files are anything like mine in which labels are occasionally mixed in with numeric data, be warned that *PFS: Graph* will balk at these inconsistencies and will not give you what you want.

PFS:Graph also has the ability to read data from a PFS file without any special preparation. Depending on the situation, you can read data from all forms in the file or from selected forms. Again, you must be able to specify completely what is coming in, as you will not be able to examine it during the data transfer operation.

One rather nasty problem I had was trying to get rid of data for an existing graph when I started to enter data for a new one. On page 1-5 of the manual it states that "if you want to change the X data format, you must clear the chart and start again." Unfortunately, not until page 3-13, does the manual tell how to clear out the old data. Once I learned I had to enter a CONTROL-R from the Define Chart Menu, I was okay. However, I felt this should have been mentioned much earlier in the manual to save unnecessary gnashing of teeth and leafing through pages.

The Way You Want It

The Define Chart function is used to change the way *PFS:Graph* displays your chart, and to add explanatory information to it. Using Define Chart, you can display most data in any of three formats (bar, line, or pie chart). You can "stack" the individual graphs on top of each other, adjust the Y axis to a different scale, and specify that the data in one or more of the graphs be displayed cumulatively. You can provide legends to identify data from each graph and titles for the chart

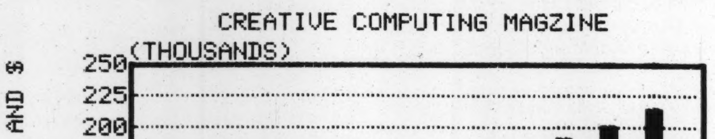


Figure 3. Same as Figure 2, but printed in expanded format (originally 8-1/2 x 11).

TWO MILLION PEOPLE COULD USE YOUR SOFTWARE.

TOO BAD THEY'VE NEVER HEARD OF YOU.

At last count, more than a couple of million Americans owned personal computers. And that number is expected to triple by 1985.

That's a fertile environment for software sales. But a lot of personal computer software organizations are discovering it's not as easy as they might have thought.

The problems boil down to these:

Lack of awareness on the part of personal computer buyers. Lack of understanding on the part of personal computer salespeople. Lack of unlimited dollars to advertise in the myriad magazines that reach this small segment or that small segment of the total market.

If any of this sounds like a familiar frustration to you, we've got good news. *LIST* is here. And its advent heralds a new era in cost-effective software marketing.

LIST isn't another guide. It's not another directory. It's an informative new publication that puts software first. And puts you in touch—directly, inexpensively—with the fastest growing segments of the personal computer market.

With *LIST,* you'll be able to reach business and professional people at a critical point in the purchase cycle—*before* they've bought their hardware.

At the same time, you'll be able to impact another significant market segment—those people who already own personal computers, and are eager to learn how they can do more with them.

To find out how *LIST* can expand the awareness of your software for less than $200, send us this coupon. (Hurry! We go to press December 15.)

Or don't. And go on being less well known than you deserve to be.

LIST is published by Redgate Publishing Co., an affiliate of E. F. Hutton and Co.

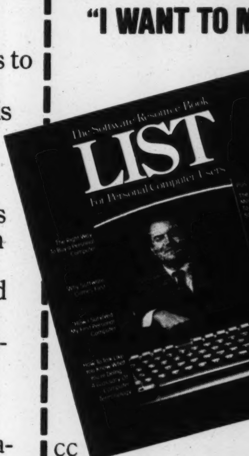
1 800 327-1300

"I WANT TO MAKE MORE PEOPLE AWARE OF MY SOFTWARE."

☐ Please send me literature that explains how *LIST* can help.

☐ I don't want to wait on the mails. Call me right away.

Send to *LIST,* Redgate Publishing Co., 3407 Ocean Drive,
Vero Beach, FL 32960. **Or phone 1 800 327-1300.**



NAME TITLE

COMPANY TELEPHONE

ADDRESS

CITY STATE ZIP

CC

LIST™
The Software Resource Book
For Personal Computer Users

CIRCLE 264 ON READER SERVICE CARD

and axes. Finally, you can control the horizontal grid line and display the chart in color (if you have a color monitor).

While this sounds quite comprehensive, it is at this point that various limitations rear their ugly heads. The chart, X axis, and Y axis titles can be up to 26 characters long. Thus, in the charts labeled "Creative Computing Magazine," magazine must be spelled "magzine." Why not 40 characters as in *VisiPlot*?

In bar charts, up to four sets of data may be displayed side by side. However, because of screen and printer resolution limitations, if four sets of data are displayed, only nine X axis data points may be used. In other words, a maximum of 36 bars may be displayed in the X direction. Even so, it is a bit cramped. See Figures 2 and 3 which display 24 bars side by side.

Up to four data points may be "stacked" in a bar (Figure 4 shows three stacked values).

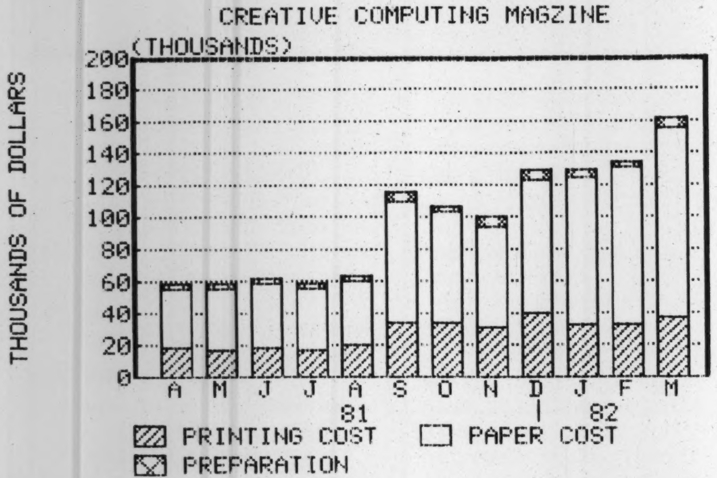


Figure 4. Bars can consist of up to four data points identified by color or shading.

Bar and line graphs may be combined in a single chart. However, if bars are stacked in the bar graph portion, the line graph is stacked on top of the bars. Thus, while I would have liked to show a line graph of the total print run on top of the stacked bar graphs showing printing costs (Figure 4), this was not possible. While *VisiPlot* is more cumbersome in specifying the layout of graphs, it would have allowed me to combine these items. Also, *VisiPlot* allows a line graph to overlap a bar graph, whereas with *PFS:Graph*, the line chart must always be above and separate from the bar chart portion.

VisiPlot permits a "floating" label to be placed anywhere on the chart. *PFS:Graph* does not have this feature.

An outstanding feature of *PFS:Graph* is the ability to graph cumulative data. When this feature is selected, each point on the graph represents the total, or cumulative, Y value up to that point. Figures 5 and 6 illustrate this capability.

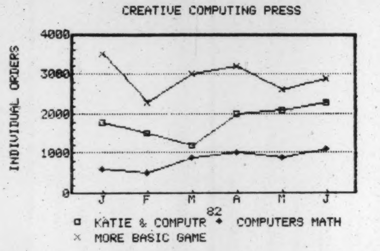


Figure 5. Line chart shows monthly sales of three books.

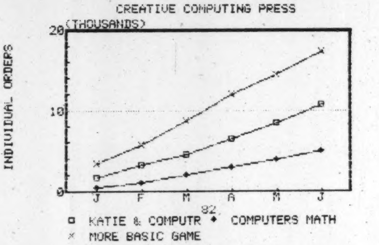


Figure 6. Using the same data as Figure 5 but plotted cumulatively.

Pie charts usually show quantitative data in percents or absolute numbers that are part of a whole, and can dramatize comparisons between parts in relation to the whole. *PFS:Graph* permits plotting up to eight segments. The X axis labels determine the number of segments and Y axis values determine the size of each segment. Whether you want it to or not, *PFS:Graph* always converts the absolute numbers to percentages in the pie chart labels (see Figure 7). Unfortunately, if you want to use the same data for both a bar and pie chart it probably will have to be entered twice because the X labels for a bar chart are likely to be different from those on a pie chart.

For a more pleasing appearance, it may be desirable to rescale a graph. I had one uncomfortable moment trying to rescale the bar graph showing *Creative Computing* Magazine print runs from the 300,000 maximum provided automatically by *PFS:Graph* to a more visually pleasing 250,000 (see Figure 8). I specified a Y axis range of 0-250 and got the graph shown in Figure 9. This is clearly not what I desired, and it took me several minutes to realize that the rescale value must be in terms of the total units (250,000) and not in terms of the value shown on the scale (250). Using the correct value produced the desired result (see Figure 10).

Printing and Saving Graphs

The Print/Plot routine allows any graph to be printed on a Silentype, Epson, or any other printer connected with a Grappler interface card. It may also be plotted on an HP7470A Plotter. The graphs may be printed in both "normal size" (approximately 3" x 4") or in expanded size to fill an 8 1/2" x 11" page. Figures 3 and 4 are printed in the expanded format. Note the much better resolution. All the illustrations for this article, by the way, were printed on a Silentype printer.

A much better copy on paper or transparency may be produced with the HP7470A plotter. The program has an option to halt for a pen change after plotting a given portion of the information. This permits multicolored charts to be drawn. The quality of these charts is outstanding.

The Get/Remove Chart function is used to "save, retrieve or delete" a chart stored on a diskette. I had anticipated that saving a chart in this way would permit it to be retrieved by one of the slide show systems such as the Lotus *Executive Briefing System*, *Screen Director System*, or *C & H Slide Show*. But alas, this does not seem to be possible. The *PFS:Graph* system stores slides in a peculiarly-formatted disk system which

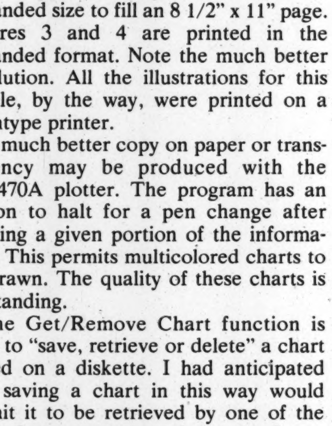


Figure 7. Pie chart values are always converted to percentages.

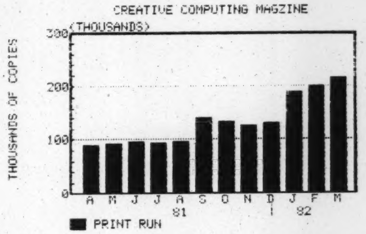


Figure 8. Creative Computing print run, 4/81-3/82. Scaling is chosen automatically by PFS: Graph.

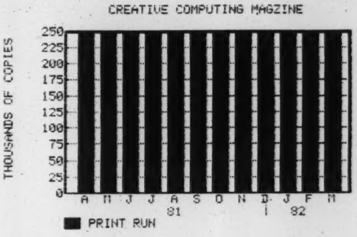


Figure 9. Result of re-scaling Figure 8 using 0 to 250 (the value printed on the axis).

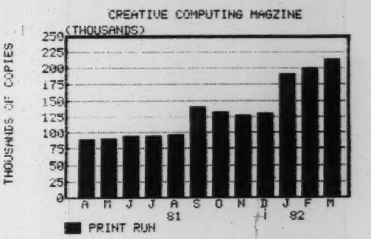


Figure 10. Correct re-scaling using 0 to 250,000 and 25,000 Y-axis dividing lines.

can be read only from the *PFS:Graph* software system (or perhaps from Pascal). Indeed, it is not even possible with Apple DOS to list a catalog from a *PFS:Graph* data disk; nor is it possible to store a graph in the hi-res page and BSAVE it to another disk because the normal DOS is not operative with the *PFS:Graph* system. This is a real pity because, in general, it is easier to make a chart using *PFS:Graph* than with *VisiPlot*. However, the manual gives no clue how to use these graphs with any other system if, indeed, it is possible at all. Thus, as I stated at the beginning, it is necessary to have a printer or plotter if you wish to disseminate the information from *PFS:Graph*.

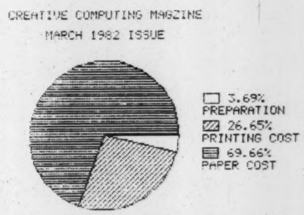


Figure 11. Pie chart percentages are automatically rounded to two decimal places.

The Bottom Line

In summary, *PFS:Graph* is an easy-to-use, versatile system for producing bar, line and pie charts on a Apple computer. The finished graphs can be produced more quickly than with *VisiPlot* and the expanded printer option is a decided plus. The menus are clear and self-explanatory. The ability to graph cumulative data is excellent. On the other hand, *PFS:Graph* is not as versatile as *VisiPlot* in labelling, data manipulation, or combining several graphs on the same chart. Furthermore the manual gives no instructions for retrieving the graphs with any other software system. □

CIRCLE 350 ON READER SERVICE CARD

Computer-Ed.
Of
Carmel, NY & Los Angeles, CA
99/4(A) Programs
- K-6 Reading
- K-6 Language Arts
- K-6 Math
  - Follow-up Games and Worksheets
  - Classroom Tested
  - Also Available for TRS-80 Level II

For
FREE Catalogue
Write To:
Computer-Ed.
1 Everett Rd.
Carmel, NY 10512

CIRCLE 144 ON READER SERVICE CARD

ALF COPY SERVICE
FAST • RELIABLE • LOW COST

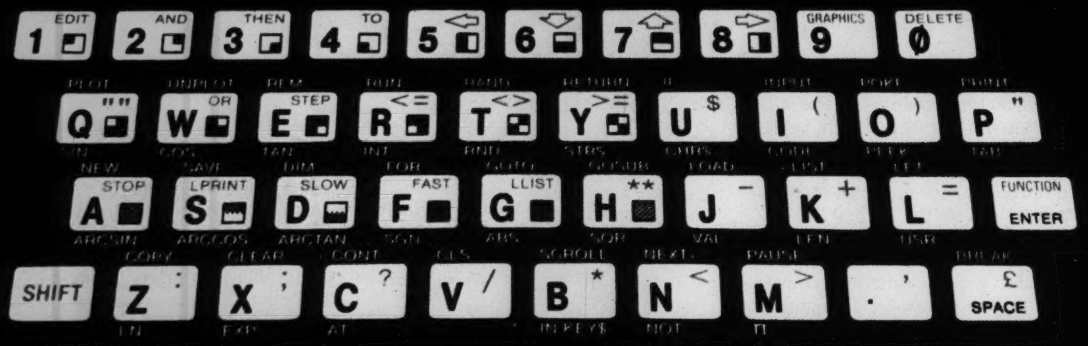
If you need your software duplicated quickly and conveniently, ALF's disk copying service is the answer. Most orders are shipped in less than a week. Every disk we copy is verified bit by bit and guaranteed 100% flawless. Standard formats include Atari, Apple (including nibble-copy-proof and double-boot formats), and TRS-80 model 1.

Our "no frills" pricing means you don't have to buy extras you don't need. Of course, we have the frills too — including custom printing and packaging. Call us today for complete details.

BLANK 3M DISK $1.65
BOX OF 100

COPIED 3M DISK $1.95
MULTIPLES OF 50

ALF (303) 234-0871 1448 ESTES DENVER, CO 80215



THE $99.95 PERSONAL COMPUTER.

Introducing the Sinclair ZX81.

If you're ever going to buy a personal computer, now is the time to do it.

The Sinclair ZX81 is the most powerful, yet easy-to-use computer ever offered for anywhere near the price: only $99.95* completely assembled.

Don't let the price fool you. The ZX81 has just about everything you could ask for in a personal computer.

A breakthrough in personal computers.

The ZX81 is a major advance over the original Sinclair ZX80 – the first personal computer to break the price barrier at $200.

In fact, the ZX81's 8K extended BASIC offers features found only on computers costing two or three times as much.

Just look at what you get:

- Continuous display, including moving graphics
- Multi-dimensional string and numerical arrays
- Mathematical and scientific functions accurate to 8 decimal places
- Unique one-touch entry of key words like PRINT, RUN and LIST
- Automatic syntax error detection and easy editing
- Randomize function useful for both games and serious applications
- 1K of memory expandable to 16K
- A comprehensive programming guide and operating manual

The ZX81 is also very convenient to use. It hooks up to any television set to produce a clear 32-column by 24-line display. It comes with a comprehensive programming guide and operating manual designed for both beginners and experienced computer users. And you can use a regular cassette recorder to store and recall programs by name.

Sinclair technology is also available in Timex/Sinclair computers under a license from Sinclair Research Ltd.

Order at no risk.**

We'll give you 10 days to try out the ZX81. If you're not completely satisfied, just return it to Sinclair Research and we'll give you a full refund.

And if you have a problem with your ZX81, send it to Sinclair Research within 90 days and we'll repair or replace it at no charge.

Introducing the ZX81 kit.

If you really want to save money, and you enjoy building electronic kits, you can order the ZX81 in kit form for the incredible price of just $79.95.* It's the same, full-featured computer, only you put it together yourself. We'll send complete, easy-to-follow instructions on how you can assemble your ZX81 in just a few hours. All you have to supply is the soldering iron.

A leader in microelectronics.

The ZX81 represents the latest technology in microelectronics. More than 10,000 are sold every week. In fact, the ZX81 is the fastest selling personal computer in the world.

We urge you to place your order for the ZX81 today.

To order.

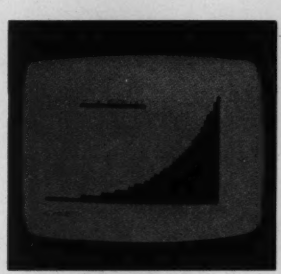
To order, simply call toll free. Or use the coupon below. Remember, you can try it for 10 days at no risk.** The sooner you order, the sooner you can start enjoying your own computer.

Call toll free 800-543-3000.

Ask for operator #509. In Ohio call: 800-582-1364; in Canada call: 513-729-4300. Ask for operator #509. Phones open 24 hours a day, 7 days a week. Have your MasterCard or VISA ready.

These numbers are for orders only. If you just want information, please write: Sinclair Research Ltd., 2 Sinclair Plaza, Nashua, NH 03061.

*Plus shipping and handling. Price includes connectors for TV and cassette, AC adaptor, and FREE manual.
**Does not apply to ZX81 kits.



NEW SOFTWARE: Sinclair has published pre-recorded programs on cassettes for your ZX81. We're constantly coming out with new programs, so we'll send you our latest software catalog with your computer.

16K MEMORY MODULE: Like any powerful, full fledged computer, the ZX81 is expandable. Sinclair's 16K memory module plugs right onto the back of your ZX81. Cost is $49.95, plus shipping and handling.

sinclair

To order call toll free: 800-543-3000

Ad Code A1CC	Price*	Qty.	Amount
ZX81	$99.95		
ZX81 Kit	79.95		
16K Memory Module	49.95		
Shipping and Handling	4.95		$4.95
		TOTAL	

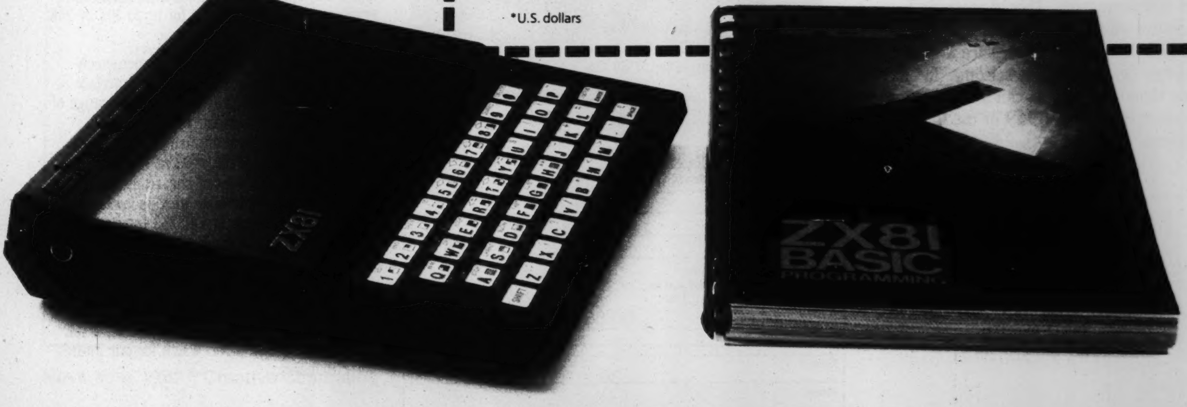
MAIL TO: Sinclair Research Ltd.,
One Sinclair Plaza, Nashua, NH 03061.

Name__________

Address__________

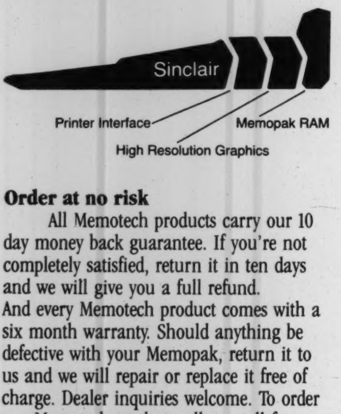
City__________ State__________ Zip__________

*U.S. dollars



BEHIND EVERY GOOD SINCLAIR IS A MEMOPAK

If you own a Timex-Sinclair 1000 or ZX81 computer, you should have a Memopak behind it. From increased memory to high resolution graphics, Memotech has a Memopak to boost your system's capabilities. Every Memopak peripheral comes in a black anodised aluminum case and is designed to fit together in "piggy back" fashion to enable you to continue to add on and still keep an integrated system look.



Order at no risk

All Memotech products carry our 10 day money back guarantee. If you're not completely satisfied, return it in ten days and we will give you a full refund.
And every Memotech product comes with a six month warranty. Should anything be defective with your Memopak, return it to us and we will repair or replace it free of charge. Dealer inquiries welcome. To order any Memotech product call our toll-free number **800/662-0949** or use the order coupon.

MEMOTECH
CORPORATION

7550 West Yale Avenue
Denver, Colorado 80227
(303) 986-1516
TWX 910-320-2917

MEMOPAK 64k
MEMOPAK 16k
MEMOPAK HRG
MEMOPAK I/F

Mail to: Memotech Corporation, 7550 West Yale Ave., Denver, CO 80227
Code: CC-11

	*Price	Qty.	Total
64K RAM	$179.95		
32K RAM	109.95		
16K RAM	59.95		
Centronics Parallel Printer Interface	104.95		
RS232 Printer Interface	139.95		
High Resolution Graphics	144.95		
Shipping and handling	4.95		$4.95

* All prices quoted in U.S. dollars
** Colorado residents please add sales tax
☐ Check ☐ MasterCard ☐ Visa

Tax**
Total

Account No. ______ Exp. ______

Name ______
Address ______
City ______ State ______ Zip ______

Memopak 64K RAM The 64K RAM extends the memory of your Sinclair by 56K to a full 64K. It is directly addressable, user transparent, is neither switched nor paged and accepts such basic command as 10 DIM A (9000). The Memopak 64K turns your Sinclair into a powerful computer suitable for business, recreational and educational use. No additional power supply is required.

Memopak 32K RAM The 32K RAM Memopak offers your Sinclair a full 32K of directly addressable RAM. Like the 64K Memopak, it is neither switched nor paged and enables you to execute sophisticated programs and store large data bases. It is also fully compatible with Sinclair's or Memotech's 16K RAM to give you a full 48K of RAM.

Memopak 16K RAM The Memopak 16K RAM provides an economical way to increase the capabilities of your Sinclair. And at the same time, it enables you to continue to add on other features with its "piggy back" connectors. It is compatible with the Sinclair 16K or a second Memopak 16K or Memopak 32K to give 32K or 48K of RAM respectively.

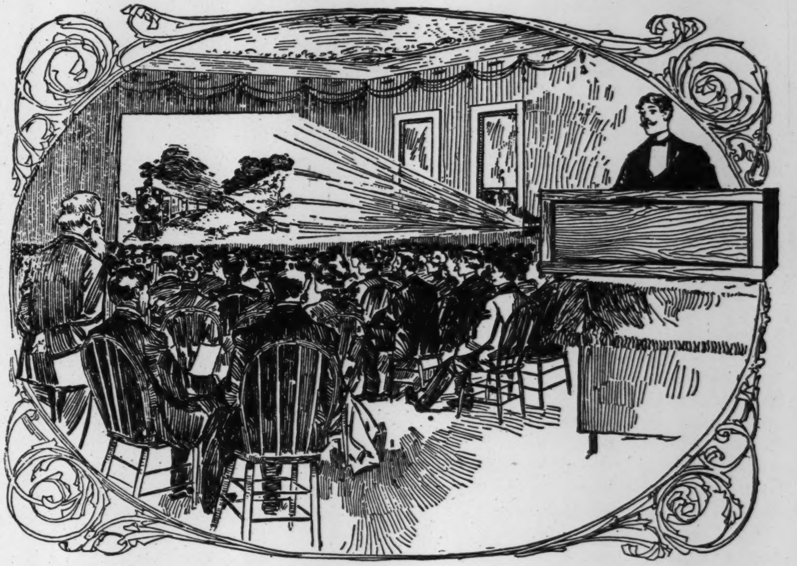
Memopak High Resolution Graphics The Memopak HRG contains a 2K EPROM monitor and is fully programmable for high resolution graphics. The HRG provides for up to 192 by 248 pixel resolution.

Memopak Printer Interface The memotech centronics parallel or RS232 printer interface paks enable your Sinclair to use a wide range of compatible printers (major manufacturers' printers available through Memotech at significant savings). The resident software in the units gives the ASCII set of characters. Both Memopak printer interfaces provide lower case character capabilities. The RS232 Interface is also compatible with modems.

New products coming soon Memotech will soon be introducing four new Sinclair compatible products: a high quality, direct connection keyboard, a digitizing tablet, a 16K EPROM and a disk drive. Watch for our future advertisements.

Make Your Apple Into a Slide Projector

David H. Ahl



From the spate of new product releases, one might conclude that personal computer software vendors are taking aim at Kodak and the slide show market. Within three months, four software packages designed to create electronic slide shows have been released for the Apple alone. Two packages also offer the ability to make up text images (slides), while one additionally offers the capability of making graphic images.

We took a close look at all four systems and their capabilities. In addition, I asked Kerry Shetline of our Software Development Group to write a "Poor Man's Slide Show System." It lacks the elegance and speed of the other systems, but if you don't mind a bit of typing and a seven- to ten-second slide load time, the price is right (free).

ELECTRONIC SLIDE SHOW SYSTEMS FOR APPLE II

	Executive Briefing System	**Screen Director**	**The Slide Show**	**Apple Flasher**	**"Poor Man's"**
Capability to create or modify text slides	Yes	Yes	No	No	No
Capability to create or modify graphics slides	Yes	No	No	No	No
User Interface	Menu	English-like commands	Menu	Menu	Program command
Images (Slides) per disk	32	17	16	16	16
Slide Transitions:					
Timed automatic (seconds)	2 or more	5 or more	8-999	2-240	8 or more
Keyboard/game button	Yes	Yes	Yes	Yes	Yes
Forward and reverse	Yes	Yes	No	Yes	Yes
Select any slide	Yes	Yes	No	Yes	No
Transitional effects	5	2	20	1	1
Print Slides	Yes	Yes	No	No	No
Pages in manual	157	122	52	6	n/a
Price	$199.00	$150.00	$39.95	$34.50	free

Lotus Executive Briefing System

David H. Ahl

The *Executive Briefing System* is a graphics package designed to present a series of text or graphics "slides" on a monitor or TV set controlled by an Apple computer. The "slides" may be created with the *Executive Briefing System* or with other hi-resolution graphics packages, such as VisiPlot or Apple Business Graphics Package.

The program allows the user to create a slide show on disk which can run automatically or manually using paddle controllers or the keyboard to advance, backup, or view individual slides.

The *Executive Briefing System* package comes complete with a demonstration diskette (the Conoco Takeover), extensive manual including a 95-page tutorial section and 53-page reference section and, of course, the program diskette.

The system requires a 48K Apple, one or more disk drives (two preferred), Applesoft Basic in ROM (or a language card), monitor or TV set (color preferred). Graphics printer and paddle controller are optional.

The system is easy to learn and use. It took me only about an hour before I was comfortable with most of the features and able to produce slides of my own. Quick progress is aided by the excellent tutorial manual which contains screen photos on virtually every other page.

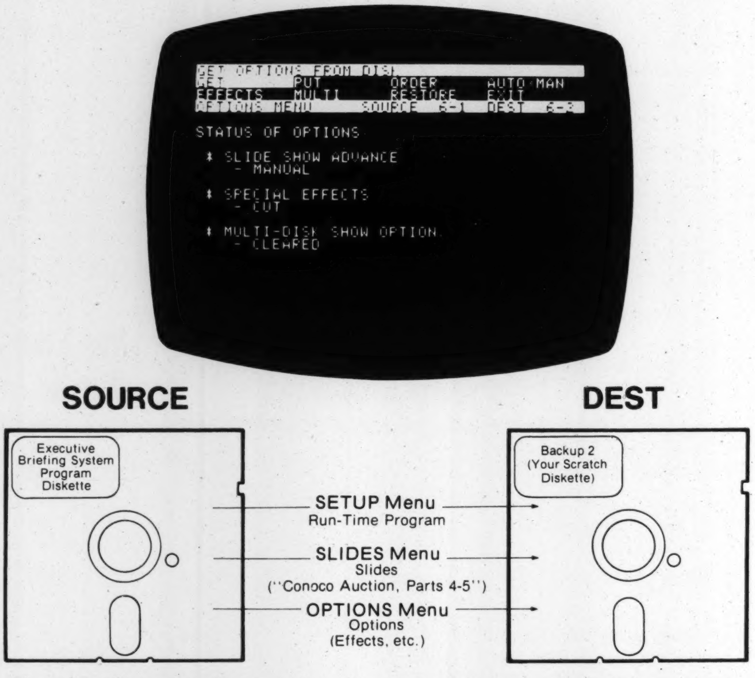
Tutorial Lesson 1 uses the demonstration disk, "The Conoco Auction," to demonstrate how to present a slide show with the EBS run-time program. A slide show can be run automatically with the user specifying the amount of time (in seconds) that each slide is to remain on the screen. If you want to allow more time to read a particular slide or point something out to an audience, the show can be interrupted by simply pressing the space bar. The show is then resumed by pressing any key.

It is also possible to use the right and left arrow keys to advance to the next slide or go back to the previous one. With the show set up for automatic advance, the left arrow key reverses the direction of the show. The Conoco demonstration diskette is set up to display each new slide with a rising curtain effect. However, other effects are possible, including a falling curtain, dissolve, spiral (out from the center), or simple cut. For variation, it is possible to specify "random" which as its name implies, produces a random dissolve to the next slide. All of these parameters may be changed either when the show is being made up or at run time.

One last option at run time is the ability to view a slide out of sequence. By bringing the main menu to the screen during the slide presentation and selecting VIEW, the current slide is replaced by a double-column list of all the slides on the disk. Using the cursor and right or left arrow keys you simply select the slide you wish to view, press Return and it is immediately shown.

Lesson 2 is devoted to creating a slide show diskette with the *EBS* edit program. This lesson also encourages the user to step through all of the menus and become familiar with the creation aspects of the package.

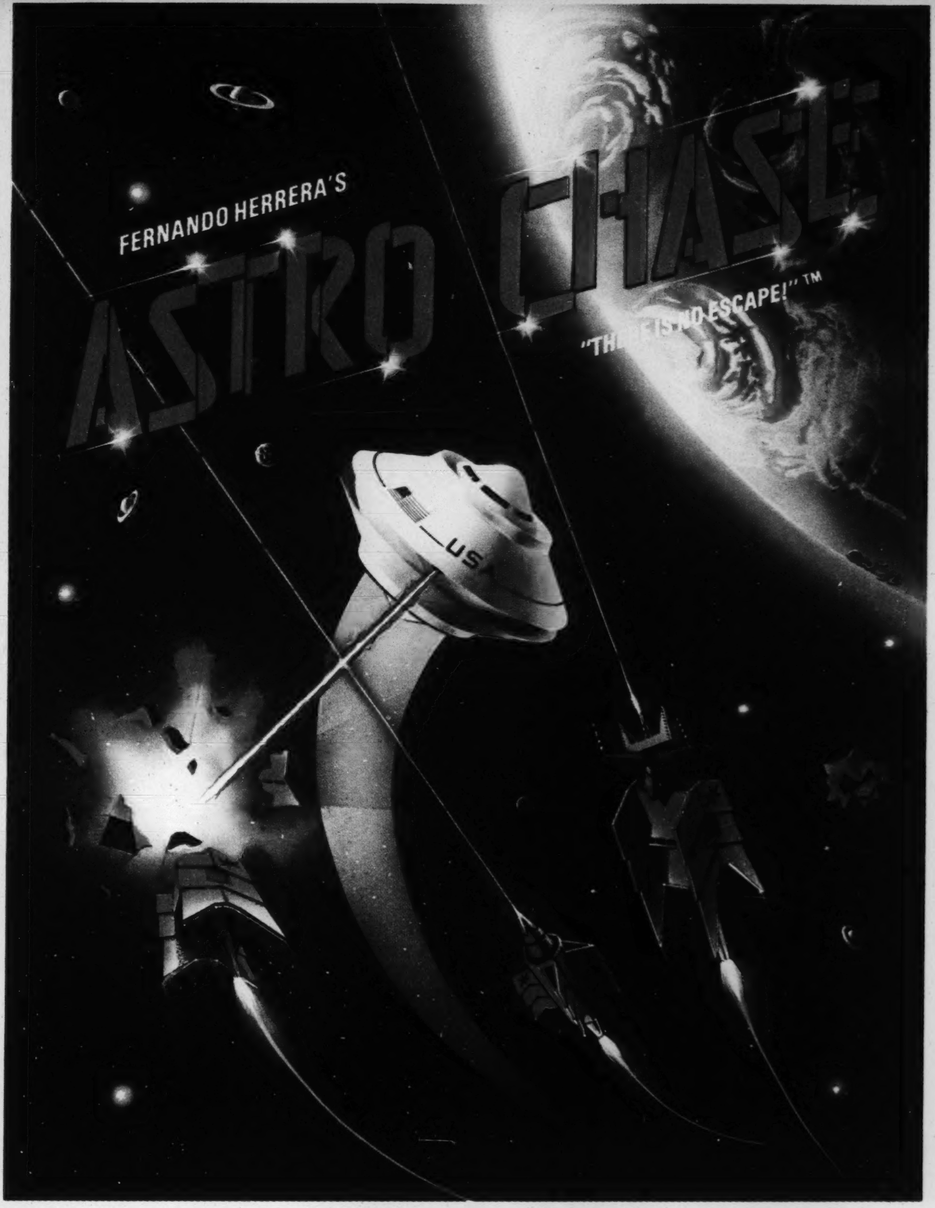
The entire package is menu driven. There are two main menus, one for creation and modification of slides and the other for running a slide show. The Run Time menu has two submenus while the Creation menu has fifteen submenus. While this may sound complicated, in fact it is not. When the cursor is placed over any menu item (all of which are full words), an explanation of that item appears in the top line on the screen. Items needing additional explanation use larger areas of the center of the screen. In the tutorial portion of the manual, the menu is frequently illustrated along with a diagram showing one or two diskettes that indicate what is being transferred between them.



```
GET OPTIONS FROM DISK
GET        PUT        ORDER      AUTO MAN
EFFECTS    MULTI      RESTORE    EXIT
OPTIONS MENU          SOURCE  6-1 DEST  6-2

STATUS OF OPTIONS

 * SLIDE SHOW ADVANCE
    - MANUAL

 * SPECIAL EFFECTS
    - CUT

 * MULTI-DISK SHOW OPTION
    - CLEARED
```

SOURCE
DEST
Executive Briefing System Program Diskette
Backup 2 (Your Scratch Diskette)
SETUP Menu
Run-Time Program
SLIDES Menu
Slides
("Conoco Auction, Parts 4-5")
OPTIONS Menu
Options
(Effects, etc.)

Figure 1. Illustration from manual shows computer screen and diagram of data transfers on disks.



NEW

FOR THE
ATARI®
HOME COMPUTER
32K
MINIMUM

DISK
AND
TAPE
$29.95*
(CARTRIDGE COMING SOON)

To Order:
Call TOLL FREE 800-223-1545
nationwide except in New York
phone 212-889-1073

VISA

When using your MASTER CARD or
VISA please have ready:
your card number & expiration date.
Send your check or money order
for $29.95* plus $2.00
shipping and handling to:
First Star Software, Inc.
22 East 41st Street
New York, NY 10017

When ordering, please specify
DISK or TAPE
*New york residents please add
7% sales tax.

Fernando Herrera Strikes Again!

In *ASTRO CHASE*, his first program since winning the ATARI® STAR AWARD, Fernando delivers: Fast, Super, ARCADE GRAPHICS ★ 100% MACHINE LANGUAGE ★ SMOOTH SCROLLING UNIVERSE (different for each new game) ★ AWESOME SOUND EFFECTS ★ NON-STOP ACTION ★ MULTI-DIRECTIONAL FIRING ★ INTELLIGENT ENEMY ATTACK SHIPS ★ SINGLE THRUST PROPULSION™ ★ INVISIBLE FORCE FIELDS ★ MULTIPLE SKILL LEVELS ★ Many more INNOVATIVE and UNIQUE features.

"THERE IS NO ESCAPE!"

Ask for FIRST STAR SOFTWARE at your local dealer.
Retail and Distribution inquiries invited.

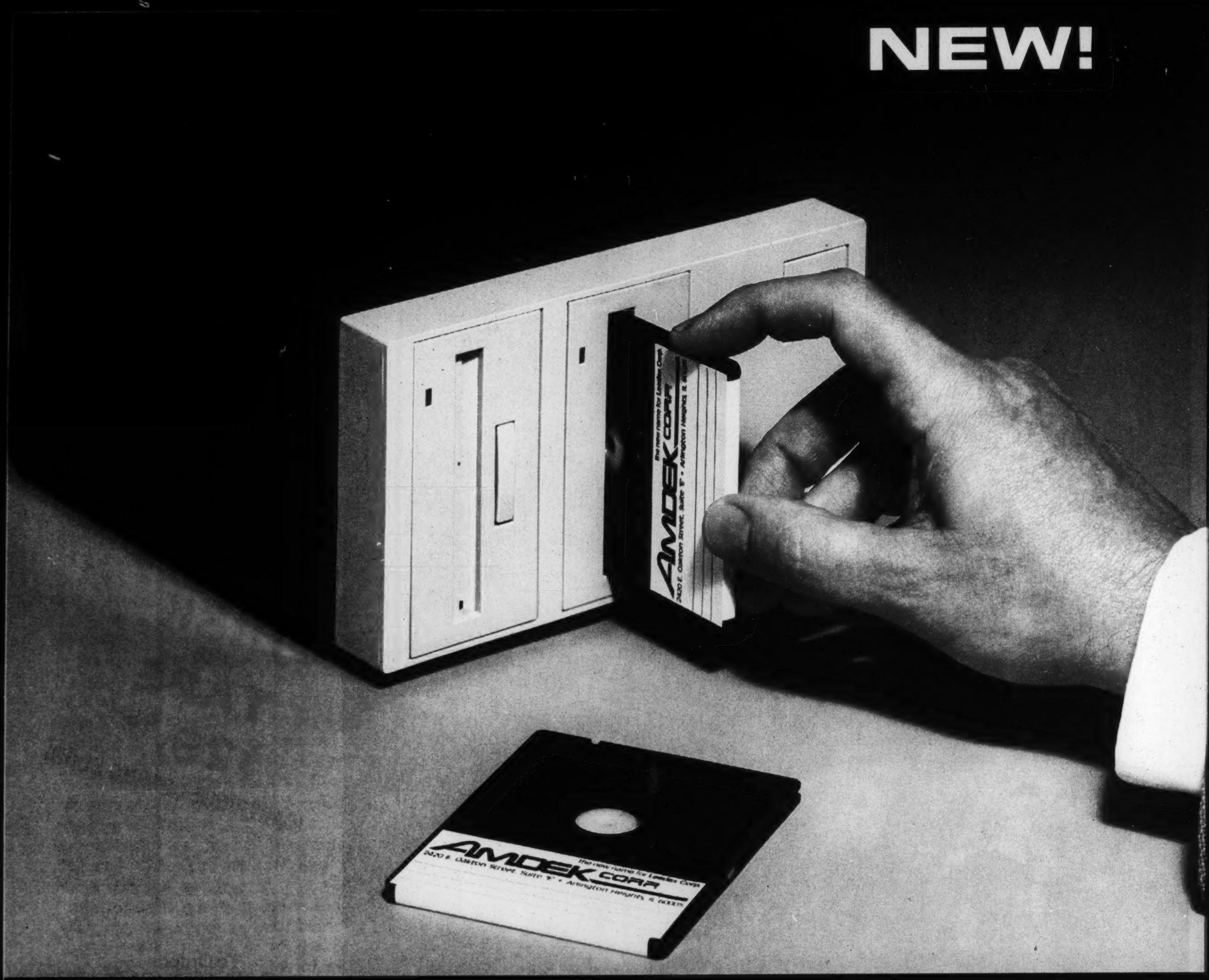
"When being first counts...we're number one"

FIRST STAR SOFTWARE INC

CIRCLE 172 ON READER SERVICE CARD

ATARI® is a registered trademark of Atari, Inc.
Single Thrust Propulsion ™ is a registered trademark of First Star Software, Inc.
ASTRO CHASE, "there is no escape!"™ is a registered trademark of First Star Software, Inc.
©, 1982 First Star Software, Inc.

NEW!


AMDEK CORP
the new name for Leedex Corp
2420 E. Oakton Street, Suite 'E' • Arlington Heights, IL 60005
AMDEK CORP
the new name for Leedex Corp
2420 E. Oakton Street, Suite 'E' • Arlington Heights, IL 60005

Kiss the 5¼″ floppydisk goodbye!

Amdek has revolutionized data storage for personal computers with the new AMDISK-3 Micro-Floppydisk drive system. The system consists of 2 drives and a power supply, fully compatible with 5¼″ floppy disk drives. The 3″ disk is encased in hard plastic, protected from dust and fingerprints, and it's easy to mail.

Just write, or call to receive our data sheet on the new AMDISK-3 Micro-Floppydisk Cartridge system.

- 1 Megabyte (unformatted) storage capacity.
- Track-to-track compatible with 5¼″ floppy-disk drives.
- 3″ shirt-pocket sized disk cartridge.
- Drive has built-in power supply.

2201 Lively Blvd. • Elk Grove Village, IL 60007
(312) 364-1180 TLX: 25-4786

AMDEK CORP.

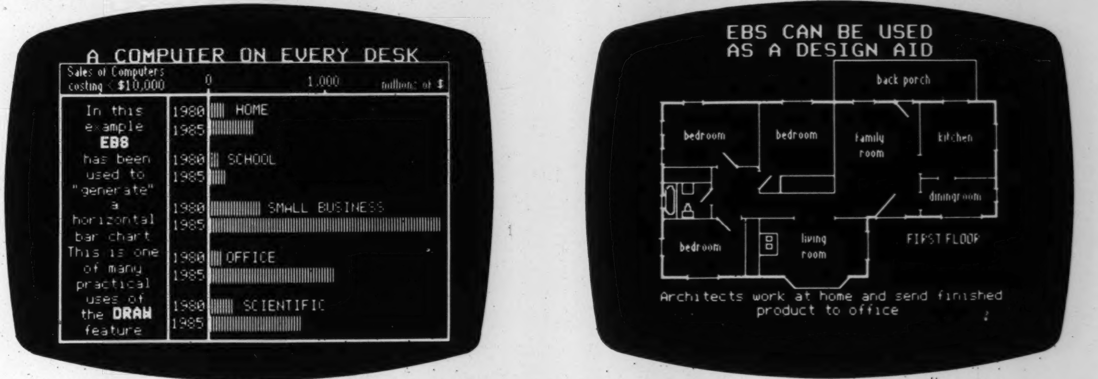
Amdek . . . your guide to innovative computing!

CIRCLE 108 ON READER SERVICE CARD

Executive Briefing, continued...

Lesson 3 comprising the next 30 pages of the manual is a tutorial on typing and drawing slides. For the most part, the cursor behaves the same as it does on a regular Apple except that there is no wrap around at the end of a line or bottom of the screen.

Three type fonts are available: Monospace (upper and lower case, looks like the regular Apple font), Compressed (upper and lower case, about 1/3 smaller than Monospace) and Large Caps (upper case only, about 1/3 larger than Monospace). In addition, all type faces are available in regular or boldface style (upper case letters only) and in reverse (black on white instead of white on black).



A COMPUTER ON EVERY DESK

In this example **EBS** has been used to "generate" a horizontal bar chart This is one of many practical uses of the **DRAW** feature

EBS CAN BE USED
AS A DESIGN AID

Architects work at home and send finished product to office

Figure 2. Detailed slides can be produced using the "Draw" feature.

If these fonts aren't enough, Lotus has 72 additional fonts (Lotus Alphabets) available on three disks of 24 each ($25 per disk). Some are quite astounding and substitute small graphics characters (hearts, diamonds, etc.) for punctuation marks.

While it is possible with all the type faces to go wild in creating "spectacular" slides, I found that by sticking to one or two type fonts and styles I produced a far more readable finished slide. I also found that lower case Compressed was barely readable in color, even on a high quality color monitor. Hence, I avoided this style except where I had to squeeze a caption into a very small space.

In addition to text, *EBS* provides the ability for doing both high and low resolution drawing. Although the manual states, "the possibilities are limitless," we found that drawing with a one-pixel wide cursor using the keyboard was extremely tedious. On the other hand, we won't deny that folks with the patience of Job will be able to produce some outstanding graphics. Witness those on the Conoco demonstration disk and in the manual.

In both the text and drawing modes, six different colors are available: green, purple, orange, blue, white and black. Black, of course, is most useful for erasing mistakes made in the other colors.

In the drawing mode, there are two different cursor sizes: regular (the same as the standard Apple cursor) and micro cursor (1/6 the size of the regular cursor or one-pixel in width). There are also two other cursors provided, one is six pixels high and the other six pixels wide. Although interesting, I never found any real use for either of them.

The fourth tutorial lesson addresses creating and backing up a single or multi-disk show. It emphasizes the importance of back-up disks, and explains the use of the "help" menu. It also explains how to print slides with the Silentype, Epson and IDS printers.

Although I created some slides using the draw features of the *Executive Briefing System*, I found it far easier to create graphs and charts using VisiPlot and load them into the *Executive Briefing System*. Incidentally, you must save the pictures created in VisiPlot using PIXSAVE, a command which is rarely used if you are using VisiPlot by itself. *Executive Briefing System* gives instructions for transferring files from one disk to another, however I found it just as easy to save the VisiPlot pictures directly on my *EBS* data disk. *EBS* will save slides in either a packed or normal format.

One minor annoyance: once a name has been assigned to a slide, it is extremely difficult to change it without several disk transfers. A word to the wise: think out the name for each slide and make it as short as possible so that it will fit on the screen when you view the directory menu. Remember, only 16 characters will be visible.

When editing slides created by VisiPlot, you'll find that the text lines are not in the same place. Hence, it will not be possible simply to overwrite a title line. In fact, to erase certain areas of the VisiPlot screen such as the nasty numbers which are always printed on the X axis and which I rarely want, it is necessary to use the full-size cursor to erase most of them and the micro cursor (drawing in black) to erase the top three pixels. On the other hand,

creative computing
SOFTWARE PROFILE

Name: Lotus Executive Briefing System

Type: Business graphics package

Author: Mitchell Kapor

System: 48K Apple, Disk Drives

Format: Disk

Language: Applesoft Basic with machine language routines

Price: $199.00

Manufacturer:
Professional Software Technology Inc.
180 Franklin St.
Cambridge, MA 02139
(617) 497-2077

"My subscription to Creative Computing just expired!"

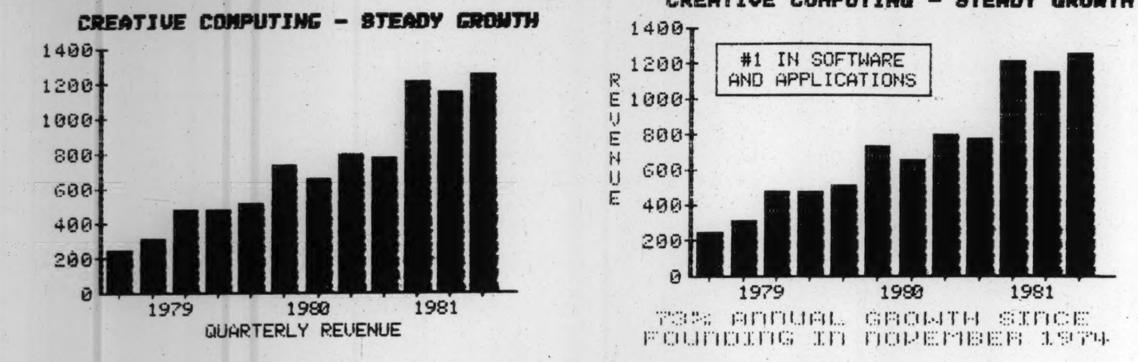


Figure 3. Graph produced by VisiPlot can be modified to include labels, colored type and borders.

the effort was well worthwhile as I was able to get a far more attractive final slide using the combination of VisiPlot and the *Executive Briefing System* than using VisiPlot alone.

In summary, the *Executive Briefing System* is easy to learn, easy to use, and produces professional results in a minimum amount of time. Applause goes to the author, Mitch Kapor, for following his successful *VisiTrend/VisiPlot* package with the *Lotus Executive Briefing System.* ☐

CIRCLE 342 ON READER SERVICE CARD

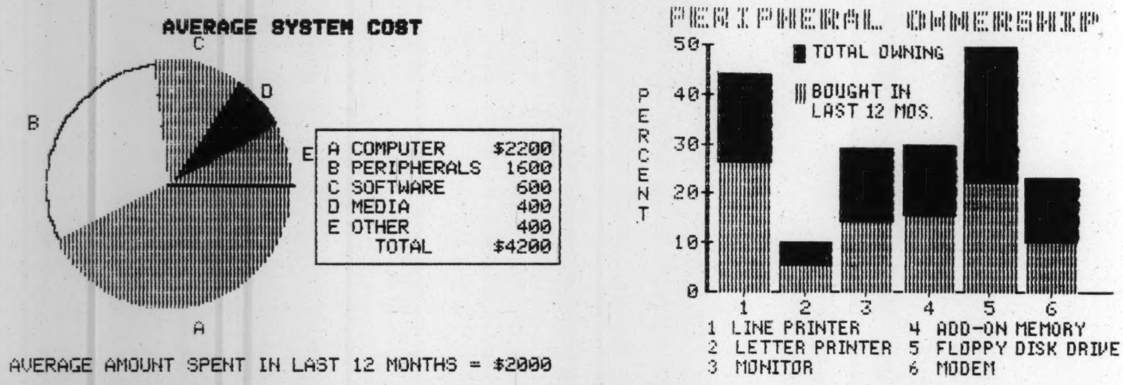
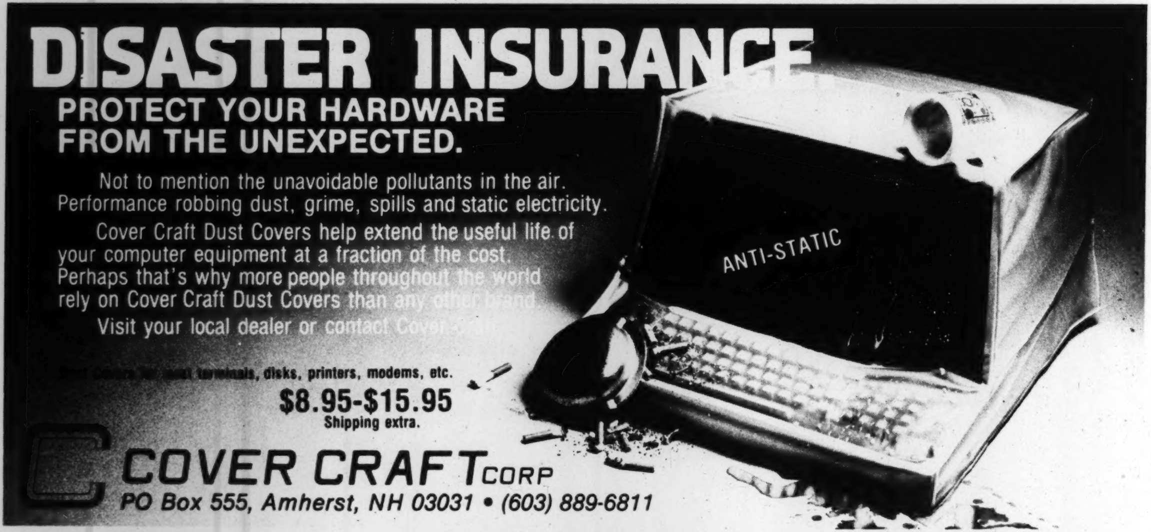


Figure 4. Line printer output is not as good as the screen since colors are not clearly differentiated.



DISASTER INSURANCE

PROTECT YOUR HARDWARE FROM THE UNEXPECTED.

Not to mention the unavoidable pollutants in the air. Performance robbing dust, grime, spills and static electricity.

Cover Craft Dust Covers help extend the useful life of your computer equipment at a fraction of the cost. Perhaps that's why more people throughout the world rely on Cover Craft Dust Covers than any other brand.

Visit your local dealer or contact Cover Craft.

Dust Covers for most terminals, disks, printers, modems, etc.

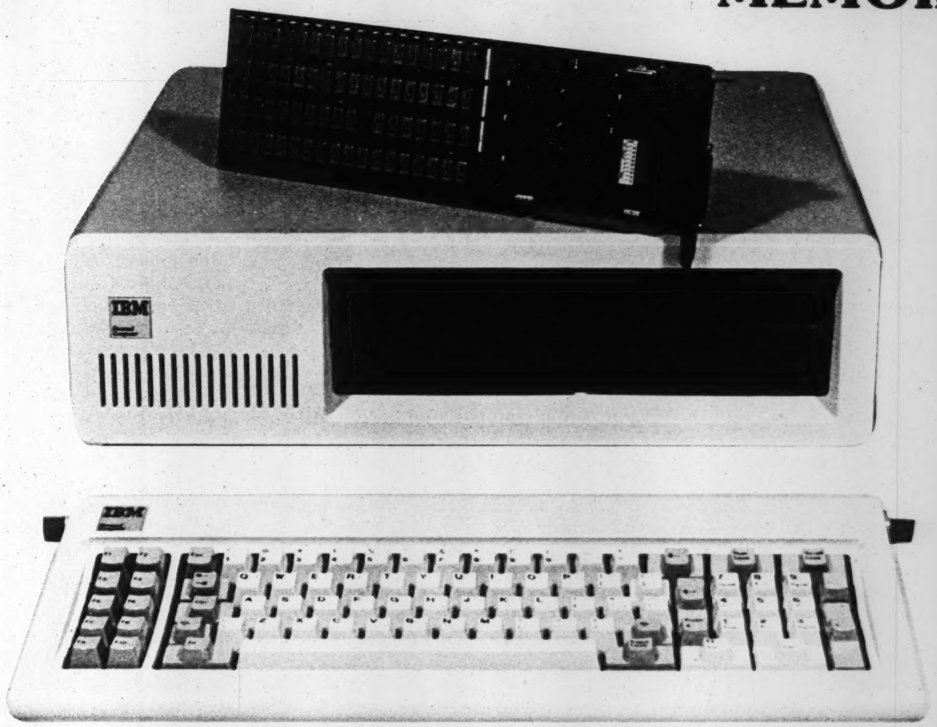
$8.95-$15.95
Shipping extra.

COVER CRAFT CORP
PO Box 555, Amherst, NH 03031 • (603) 889-6811

CIRCLE 158 ON READER SERVICE CARD

NEW

512KB WITH RS232-C PORT IBM PERSONAL COMPUTER MEMORY!



SINGLE BOARD 512KB WITH RS232-C IBM PERSONAL COMPUTER MEMORY

Designed Specifically for IBM's PERSONAL COMPUTER is Chrislin Industries newest CI-PCM+ and CI-PCM Memory Modules.

- Pin-to-pin compatibility.
- Full one year parts and labor warranty.
- On-board parity with interrupt on parity error.
- Off the shelf deliveries.
- Addressable as a contiguous block in 64KB increments thru 1 megabyte.

CI-PCM without RS232-C
256K x 9 . . . . $475.00

CI-PCM+ with RS232-C
512K x 9 . . . . $895.00

DON'T ASK WHY WE CHARGE SO LITTLE, ASK WHY THEY CHARGE SO MUCH.

Chrislin Industries, Inc.
31352 Via Colinas • Westlake Village, CA 91362 • 213-991-2254
TWX 910-494-1253 (CHRISLIN WKVG)

CIRCLE 133 ON READER SERVICE CARD

Screen Director

David H. Ahl

As the software world moves toward making software packages more user-friendly, there seem to be three distinct approaches. The first I call KISS, for Keep It Simple, Stupid. The "attract" mode on a game is an example of this. By watching the computer play for a while, you can get the hang of the game, and are able to move right into it without any further instructions. In general, this approach does not work for larger, more complex software packages. The majority of those programs today use a menu-driven approach. For example, the Visi-series of programs, PFS and Lotus packages all rely heavily upon a menu-driven approach. The third approach is to make software packages accept English-like commands. An extreme example of this is *The Last One*. In some sense, the Cobol language was a forerunner of the English-like approach to simplicity.

In any event, Business & Professional Software, Inc. have chosen the English-like approach to make *Screen Director* a user-friendly package. In effect, *Screen Director* is a mini-language for creating and showing slides in contrast to, say, the Lotus *Executive Briefing System* which is a completely menu-driven system. Since the approaches are so completely different, I can say with a reasonable degree of certainty that if you like one you will not like the other.

The *Screen Director* system consists of a manual (10 chapters, 4 appendices), a Kodak hand-held remote slide projector controller with a connector that plugs into the game port on the Apple computer, and two disks. One disk holds the *Screen Director* program, and the other is a demonstration disk with several slides and sample data.

Using a graphics package such as the *Apple Business Graphics* package or *VisiPlot*, the user creates graphic images which are stored on a data diskette. These can then be accessed from the *Screen Director* program, arranged in sequence and shown as an electronic slide show. The *Screen Director* also has the ability to create and edit text slides. It will print both graphic and text slides on a wide variety of printers including the IDS prism printer for full color output.

As I mentioned earlier, *Screen Director* uses a set of English-like commands at the system command level. The basic structure of a command is:

Verb (noun) (preposition) (modifier(s)).

Command elements in parentheses are not used in all commands. Some examples of commands that *Screen Director* understands are:

```
CLEAR TITLES
LIST DESCRIPTIONS PRINTER
SET TITLE "OIL IN THE US"
DISPLAY IMAGE SHOW: OILAXES.S.DATA
ADD
LIST
VERIFY
CREATE SHOW: BOOK SALES
SHOW FROM 8 AUTOMATATIC 10
REMOVE FIRST, 4, 8 THRU 10
MOVE 3, 5-9, LAST BEFORE 1
HELP EDIT
HELP SETUP
```

As you can see from this short list, *Screen Director* has its own language. But it is a rather natural language. I found by laying the reference card on top of the Apple, I could pretty much figure out how to create a slide show without constantly referring to the manual. Of course, I did read the manual first!

Chapter 1 of the manual is simply a description of the *Screen Director* system. Chapter 2 plunges right into a tutorial which takes you through creating a presentation (using the sample data on the second disk), making a title slide, showing the slides manually and automatically, and saving the finished show on a disk. By the time you have finished the 17 pages of this chapter, you will probably have more questions than answers. This is because many of the commands are presented simply to enable you to get your hands on the computer and show what it can do; the explanations for the commands are not given until later in the manual.

Chapter 3 presents some of the concepts of a slide tray and screen. There are three main types of screens. The first is an image such as a line graph, area plot, bar graph, picture, etc. A text screen, as its name implies, holds alphanumeric text. A message screen flashes short messages on the monitor during a presentation for instance, to remind the user to change diskettes in the drive.

Chapter 4 defines the basics of the *Screen Director* language. It also lists valid file and disk names.

Chapter 5 starts getting into the meat of things. It describes how to set up a disk for the creation of a slide show. It also describes the help commands. These are incredibly useful, particularly when you are first learning the system. There are eight help commands which describe all the other commands. In addition, there are two levels of help. The first simply describes the commands and their structure for, let's say, setting up. Typing CONTROL-A while in one of the eight help files will show you an explanation of the use of each command.

Chapter 6 deals with creating and saving a tray of slides. Note that the terminology throughout *Screen Director* is as close as possible to that used by someone showing a Kodak carousel tray of slides.

Each slide in the tray must be completely defined; it is not enough simply to give the name of the image. Five char-

creative computing

SOFTWARE PROFILE

Name: Screen Director

Type: Slide show utility

System: 64K Apple, disk drive

Format: Disk

Language: Pascal

Summary: Electronic slide show

Price: $150

Manufacturer:
Business & Professional
Software, Inc.
143 Binney St.
Cambridge, MA 02142

BENEATH APPLE MANOR

special edition

the
classic
fantasy
game
for the
Apple II
by
Don Worth

now in
hi-res

can *you*
find the
golden
apple?

Don Worth, the co-author of Beneath Apple DOS and Bag of Tricks, has returned to his first love — fantasy adventure! This special edition of the game that Softalk magazine labels a "classic" is far better than the popular original — with faster reaction time, high resolution graphics, sound effects, a deeper dungeon, and more monster types and magic items. Lots of adventure at a reasonable price . . . $29.95 .

Runs on any 48K Apple II or Apple II Plus with one disk drive.

QS QUALITY SOFTWARE

6660 Reseda Blvd., Suite 105, Reseda, CA 91335 • (213) 344-6599

CIRCLE 256 ON READER SERVICE CARD

We could tell you we make
We don't have to.

DUELING DIGITS
A HI-RES ACTION GAME BY BRIAN CHOUCH
David's Midnight Ma
Hi-Res Pinball by David Snider
TRACK ATTAC
A HI-RES ACTION GAME BY CHRIS JOCHUMSO
LABYRINTH
A HI-RES ACTION GAME BY SCOTT SCHRAM
CHOPLIFTER!
A HI-RES ACTION GAME BY DAN GORLIN
Brøderbund Software
SERPENTINI
A HI-RES ARCADE STYLE GAME BY DAVID SNIDE
Brøderbund Software
A Hi-Res Action Game by Tony Suzuki
Brøderbund Software

All for the Apple and Atari on diskette.

You keep Brøderbund at the top of the best seller lists, so you must know what it takes to make a great game. We think our APPLE and ATARI games are uniquely challenging with action and graphics second to none. But you keep asking for Brøderbund games because they're just plain fun.

Enjoy the magic of our growing collection. Lead a daring rescue mission in CHOPLIFTER. Or survive the maze and monsters in slithery SERPENTINE and LABYRINTH. Blast through the future with STAR BLAZER or conquer the ultimate pinball game with DAVID'S MIDNIGHT MAGIC. Take up train robbing in TRACK ATTACK or tense your mind and reflexes in DUELING DIGITS.

Brøderbund

Brøderbund products are available at your retailer or by writing to:
Brøderbund Software, Inc., 1938 Fourth Street, San Rafael, CA 94901 • Tel: (415) 456-6424

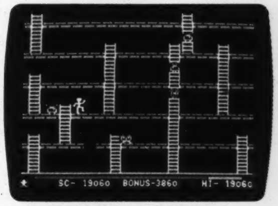
Apple II is a registered trademark of Apple Computer, Inc. Atari is a registered trademark of Atari, Inc.

the finest computer games. You keep telling us.

HIGH SCORE 000000
000000

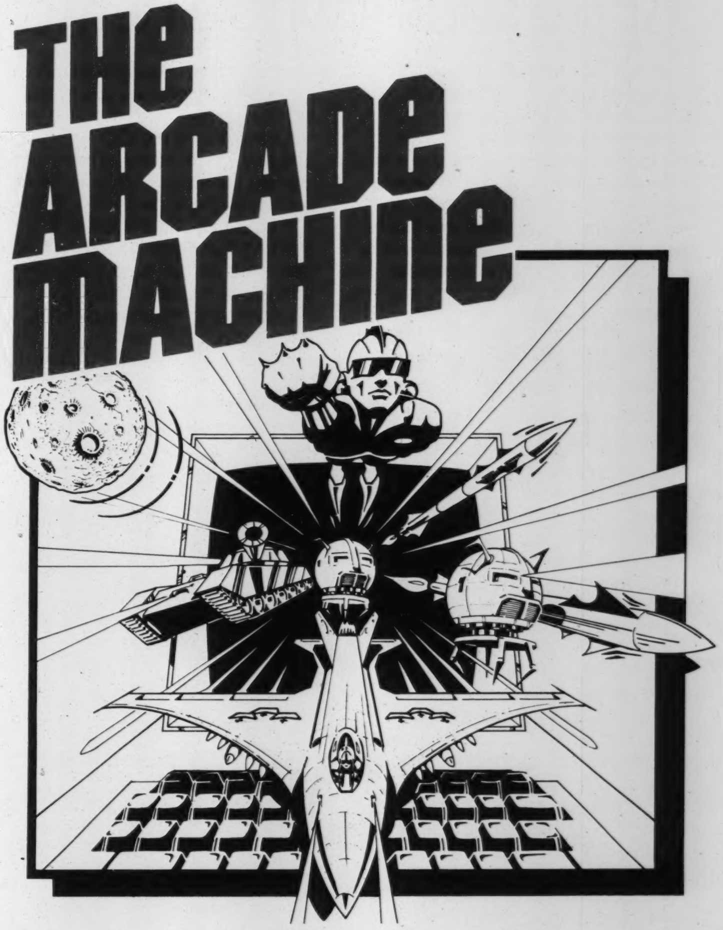
SEAFOX
Sub against the convoy
Apple & Atari disk

DEADLY SECRETS
Hi-res adventure
Apple disk



APPLE PANIC
The arcade classic
Apple disk, Atari cassette & disk

STELLAR SHUTTLE
Monsters and meteors
Atari cassette & disk



PUT US OUT OF BUSINESS! THE ARCADE MACHINE lets you design and produce your own computer games, without any programming knowledge! Send us your best game and enter the BRØDERBUND ARCADE MACHINE CONTEST. We'll be giving away thousands of dollars worth of hardware and software in prizes. If you have a creative touch and an artistic eye, you too can be an arcade designer. Write to Brøderbund for contest details or visit your participating retail store! (Available on Apple disk.)

Software

All Brøderbund games are fully guaranteed. If they ever fail to boot, return the original disk to Brøderbund for a free replacement. If you have physically damaged the disk please include five dollars for replacement.

CIRCLE 126 ON READER SERVICE CARD

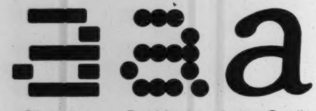
Inside Apple

Vol. 1 No. 1

Apple adds a whole new cast of characters.

As you may already know, both the Apple® II and III can drive virtually every printer on the market.

Regretfully, not every printer on the market can offer you the same level of service and support you'd expect from Apple. So the same kindly, competent dealer who healed your Apple overnight may have no idea how to fix your Samurai Ichiban daisywheel.



Silentype. Dot Matrix. Letter Quality.

That's why we thought it would be nice, maybe even profitable, to offer a full line of printers that would look like Apples, last like Apples, with Apple warranties and Apple dealer service and Apple documentation.

We even gave them Apple names:

The new Apple Dot Matrix Printer.

The new Apple Letter Quality Printer.

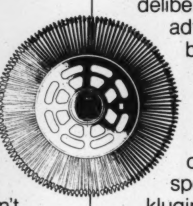
And the new Apple Thermal Printer. (Which is really the old, reliable Silentype.™)

Taking it from the top, our 7x9 Apple Dot Matrix Printer is a superb machine for correspondence-quality printing. With exceptionally legible, fully-formed characters, it gives you a choice of eight different type sizes and five different fonts. It can also give you proportional spacing. Plus boldface printing, underlining, varied pitches, varied line spacing and more.

With 144x160 dots per square inch, our Dot Matrix can put all kinds of high resolution graphics on paper—from bar charts and line graphs to digitized portraits.

The Apple Letter Quality Printer, on the other hand, is the preferred machine for just that. In fact, for any word processing or data processing applications where graphics aren't a primary concern.

For one thing, it lets you get the words out faster. At a blazing 40 cps (instead of the usual 30-35), it's the speediest letter quality printer in its price range.



It also offers a full 130-character print wheel. (The current standard is a not-so-full 96 characters.)

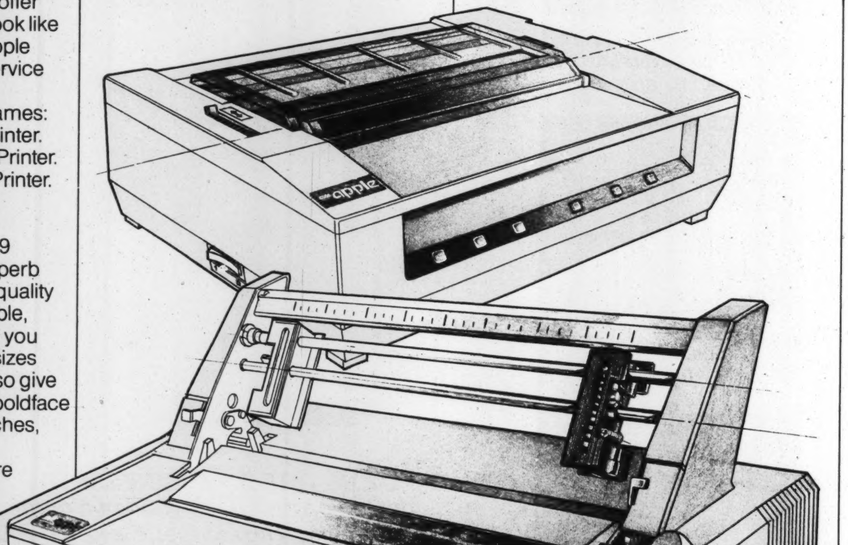
Plus varied pitches and spacing, form or line feed, operation pause—seemingly unimportant talents until you discover your machine doesn't have them.

Both the Apple Letter Quality and Dot Matrix printers come with self-teaching diskettes. So your Apple computer can tell you how to use your Apple printer.

Naturally, all our printers—including the sturdy, inexpensive Silentype™—are deliberately designed to take full advantage of all the advantages built into every Apple computer. The interfaces are clean, the electronics compatible. So you don't have to go peeking and poking to adapt print commands or parameters, or spend your summer vacation kluging an interface. Which is a lot more than we can say for the Samurai Ichiban.

All of which should stimulate you, we hope, to see the newest Apples up close.

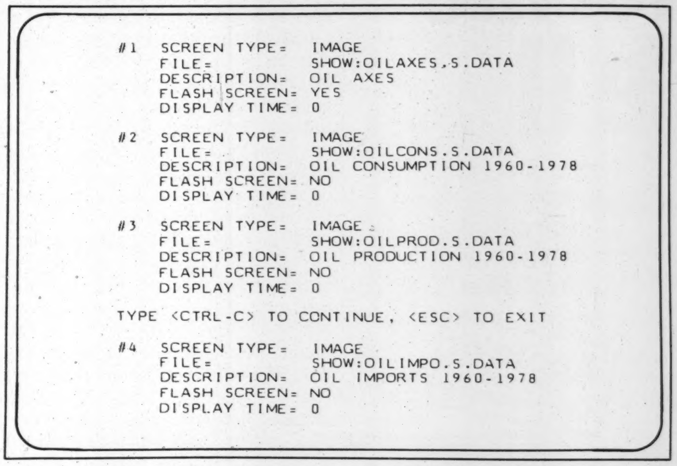
They look good, even on paper.



(800) 538-9696 (California: (800) 662-9238). Apple Computer Inc., Advertising and Promotion Dept., 20525 Mariani Ave., Cupertino, CA 95014

CIRCLE 110 ON READER SERVICE CARD

acteristics are necessary to define a slide: screen type (image, text, etc.), file (file and slide name), description, flash screen (yes or no) and display time. Flash screen means showing the slide like a blinking cursor; this really gets your attention! Figure 1 shows a list of slides in a tray with their characteristics.



```
#1  SCREEN TYPE=  IMAGE
    FILE=         SHOW:OILAXES.S.DATA
    DESCRIPTION=  OIL AXES
    FLASH SCREEN= YES
    DISPLAY TIME= 0

#2  SCREEN TYPE=  IMAGE
    FILE=         SHOW:OILCONS.S.DATA
    DESCRIPTION=  OIL CONSUMPTION 1960-1978
    FLASH SCREEN= NO
    DISPLAY TIME= 0

#3  SCREEN TYPE=  IMAGE
    FILE=         SHOW:OILPROD.S.DATA
    DESCRIPTION=  OIL PRODUCTION 1960-1978
    FLASH SCREEN= NO
    DISPLAY TIME= 0

TYPE <CTRL-C> TO CONTINUE, <ESC> TO EXIT

#4  SCREEN TYPE=  IMAGE
    FILE=         SHOW:OILIMPO.S.DATA
    DESCRIPTION=  OIL IMPORTS 1960-1978
    FLASH SCREEN= NO
    DISPLAY TIME= 0
```

Figure 1. List of four slides and their "characteristics."

Chapter 7 describes how to clear and set default values such as display time, screen type, and flash screen.

Chapter 8 describes how to make changes to trays you have created and saved previously, and also describes how to combine one or more trays, add screens, remove screens, and change their positions and characteristics. Frankly, I found this chapter somewhat confusing and I got myself into several predicaments which could only be remedied by restarting the system. I am not sure whether this was the fault of *Screen Director*, the 32K memory board in my Apple, or a raging thunderstorm outside. On the other hand, it was not a one-time occurrence.

Chapter 9 describes various procedures and commands used for presenting a tray of screens (slides). It first recommends the use of the verify command to make sure that all the screens you want to use are on-line and then goes into the show command for presenting the tray either manually or automatically. In automatic presentation mode, the slides may be shown for the same amount of time (specified at show time) or for the display time specified on each slide. In addition, if you wish to view a slide longer than the display time or automatic time, you may simply press the space bar and that slide will stay on the screen until the space bar is pressed again.

Chapter 10 describes the creation of a text screen for inclusion in your graphic slide presentation. Unfortunately, there is no provision for adding, deleting, or editing material on a graphics slide as there is in the Lotus *Executive Briefing System*. I found this a disadvantage, as the slides that I created on *VisiPlot* were not always in the final form in which I wanted to show them. Furthermore, *VisiPlot* has only one size type and I would like to have been able to use the large and inverse type faces available in *Screen Director*.

Slides may be printed on any one of several line printers as well as the IDS Prism Color Printer. Unfortunately, the entire show must be printed automatically or manually. No provision is provided for printing individual slides, say slide 7 or slide 13, from a show. Trying to print to a printer whose slot has not been specified hangs the system. Your only recourse, then, is to re-start.

Screen Director permits 17 image (graphics) screens to be stored on a disk. I felt this number was rather low, particularly in light of the many excellent hi-res packing routines on the market. For example, the Lotus *Executive Briefing System* stores 32 screens on a disk. Perhaps the reason that a disk stores so few slides is that *Screen Director* stores much additional information about each slide.

Although a Kodak slide projector control is provided, you may also use the push buttons on a set of paddles or joystick. One button moves the show forward one slide while the other moves it backward. Sorry, there is no focus control.

In contrast to the *Executive Briefing System*, which has several methods of switching from one slide to the next (downward roll, upward roll, dissolve, etc.), *Screen Director* has only two slide change methods: dissolve and overlay. The overlay is rather interesting. For example, if you wished to show a graph of oil consumption as one slide followed by a graph of oil production and oil imports as the next two slides, each could be overlaid on the previous slide as shown in Figure 2.

In summary, *Screen Director* is an excellent program for displaying hi-res graphics made by some other program along with text slides produced by *Screen*

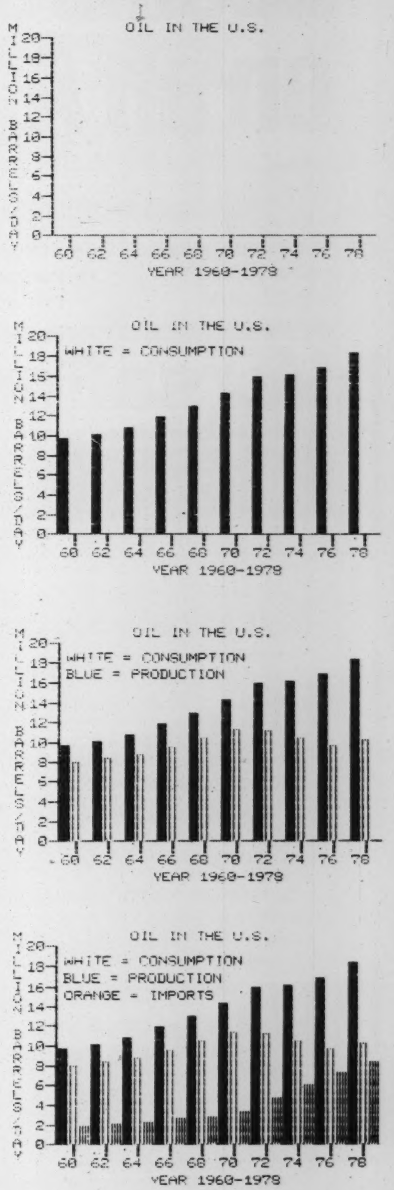


Figure 2. "Overlay" dissolve technique allows an image to be overlaid on a previous one. Here, three images are overlaid.

Put your business forms on an Apple II™

An innovative software system that speeds the processing and analysis of common business forms on a personal computer. VersaForm applications include:

- Invoicing
- Purchase orders
- Client billing
- Mailing lists
- Order processing
- Sales analysis
- Personnel records
- Inventory records

Hard Disk Versions Available

Apple III VERSIONS NOW AVAILABLE

VersaForm
Business Form Processor

Applied Software Technology
14125 Capri Drive
Los Gatos, California 95030
(408) 370-2662

CIRCLE 111 ON READER SERVICE CARD

Investigate Robotics

RHINO XR-1
HIGH-TECH ROBOT ■ FOR EDUCATION, RESEARCH & INDUSTRY

built with the same operating technology as large industrial robots

$2400

complete with 32" high robotic arm • power pak • controller card • cables • manual • tool kit

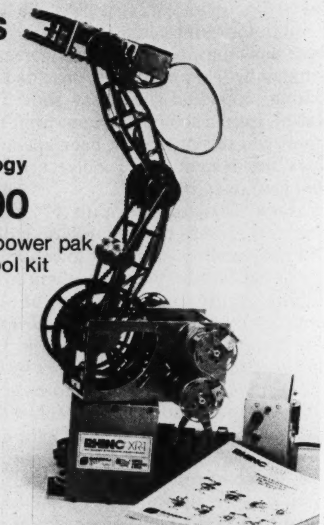
- Use with any RS-232C computer port or modem
- Rigid ¼" open aluminum construction
- Six powerful DC Servo gear motors
- Digital choppers on all axes
- Controller card with Intel® 8748 CPU
- Built-in self test program
- Reach: 22.5" maximum
- Grasp: 2"
- Lift: 16 oz. at extension

"Hands-on-Introduction to ROBOTICS, The Manual for XR-1" may be purchased separately @ $20.00 ea. p.p.

Immediate delivery. Shipped F.O.B. Champaign, IL (IL residents please add 5% sales tax) Price & specifications may be altered without notice.
Dealer/Rep. inquiries invited.

Sandhu Machine Design, Inc., Dept. CC-2
308 S. State, Champaign, IL 61820
217/352-8485

CIRCLE 269 ON READER SERVICE CARD



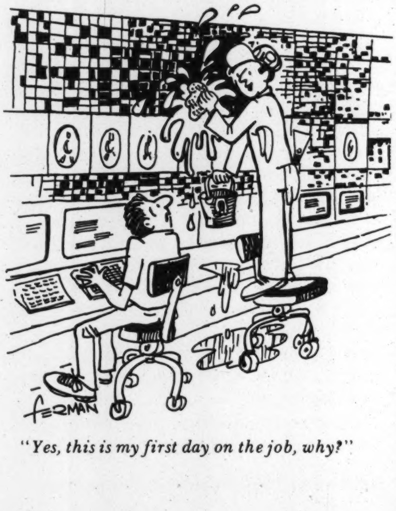
Screen Director, continued...

Director. This electronic slide show capability should be valuable in business and industry. The English-like commands will appeal to many users. The program may have a special appeal to Pascal users since it is written in Pascal and allows the running of other Pascal programs, such as *Apple Business Graphics*, from within the *Screen Director* program. The inclusion of a Kodak slide changer is a nice touch. On the other hand, the system falls short in its ability to modify or edit graphs or charts produced by another software system. Assuming you are happy with the output produced by *Apple Business Graphics* or *VisiPlot*, this is not a severe limitation. The ability to overlay one slide on the previous one is excellent, however, I would have liked to see greater visual versatility in the slide changing methods.

While the English-like commands combined with the eight help screens and reference card made using the system reasonably straightforward, I was still obliged to consult the manual more often than I do with a good menu-driven system. Also, it was not at all clear from the manual that loading an image from *VisiPlot* or some other system, displaying it, and storing it as a slide would require a disk change although common sense tells you that this must be so. (Note: none of the other slide systems deal adequately with this operation either, although it is extremely vital.)

Screen Director is not for everyone. If you like writing programs or have learned a foreign languge in school, you will have no trouble with it and will find it does an extremely competent job. On the other hand, if you are oriented to off-the-shelf, packaged software of the KISS or menu-driven variety, you should take a look at the *Screen Director* manual at your local computer store before sinking $150 into it. ☐

CIRCLE 343 ON READER SERVICE CARD



"Yes, this is my first day on the job, why?"

NEECO

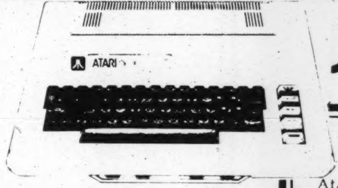
Commodore Computer

VIC 20 Personal Computer	$ 299.95
VIC 1515 Graphic Printer	$ 395.00
CBM 4016	$ 995.00
CBM 4032	$1295.00
CBM 8032	$1495.00
CBM SuperPet 9000	$1995.00
CBM 8050 Dual Disk Drive	$1795.00
CBM 4040 Dual Disk Drive	$1295.00
CBM 2031 Single Disk Drive	$ 695.00
CBM 4022 Tractor Printer	$ 795.00
CBM 8010 IEEE Modem	$ 279.00
CBM Datasette	$ 74.95
CBM IEEE Interface Cable	$ 39.95
IEEE-IEEE Interface Cable	$ 49.95

Professional Software/for CBM Computers

WordPro™ — a Family of CBM Word Processing Programs

WordPro 2 Plus	$ 199.95
WordPro 3 Plus	$ 295.00
WordPro 4 Plus	$ 450.00
WordPro 5 Plus (for CBM 8096)	$ 450.00
The Administrator (DataBase for CBM)	$ 650.00
Power™ (Programmer's Utility ROM)	$ 89.95
InfoPro™ (DataBase for CBM)	$ 295.00



Atari

Atari 400 16K	$ 299.00
Atari 800 16K (incl. BASIC cartridge)	$ 899.00
Atari 410 Recorder	$ 99.95
Atari 810 Disk Drive	$ 599.95
Atari 822 Thermal Printer	$ 299.95

Amdek Monitors

Video 100G (Limited Quantity)	$ 119.00
Video 300G	$ 185.00
Color 1	$ 425.00
Color 2	$ 899.00

CMD Mupet

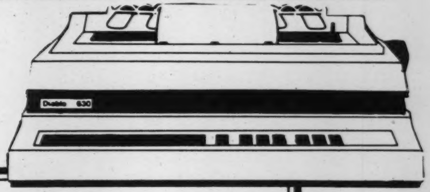
MC-800A Mupet Controller (Multi User Controller for CBM Computers)	$ 995.00
CM-100 Channel Module	$ 250.00
Printer Module	$ 350.00

Qume

Sprint 9/45	$2495.00
Tractor Option	$ 210.00

Epson Printers

MX-70	$ 299.95
MX-80 w/ Graphtrax	$ 645.00
MX-80 FT	$ 745.00
MX-100 FT	$ 945.00
INTERFACE CARDS	
8141 RS-232 Interface Board	$ 75.00
8145 RS-232 Interface Board w/2K Buffer	$ 149.00
8151 RS-232 Interface Board w/X ON-X OFF	$ 170.00
8161 IEEE Interface Board	$ 55.00
8131 Apple Interface Card	$ 85.00
8232 Apple Interface Cable	$ 35.00
8220 TRS-80 Cable	$ 35.00



Diablo 630 Printer

Diablo 630	$2710.00
Tractor Option	$ 350.00

NEC Spinwriter Printer

NEC 7730	$3085.00
NEC 7710	$3085.00
NEC 7720	$3610.00
NEC 3510	$2290.00
NEC 3500RD	$1895.00

Tractor Feed Options are available

*WordPro, POWER, & InfoPro are registered trademarks of Professional Software Inc.

CALL FOR OUR 70 PAGE CATALOG FOR COMPLETE PRODUCT LINE AND PRICE LISTINGS
WE WILL MATCH SOME ADVERTISED PRICES ON CERTAIN PRODUCTS LISTED UNDER SIMILAR "IN STOCK" CONDITIONS

NEECO
679 Highland Ave.
Needham, MA 02194

(617) 449-1760
TELEX: 951021

MON-FRI 9:00 - 5:30 E.S.T.

MASTERCARD VISA

CIRCLE 230 ON READER SERVICE CARD

Slide Show

David H. Ahl

The Slide Show is a software package designed to allow the Apple computer to emulate a 35mm slide projector on a TV or monitor. Since the authors are mainly involved with videotape production, they have put much emphasis on video-like special effect transitions between standard hi-res pictures (slides). *The Slide Show* provides 20 different transitions to use between images.

In contrast to the Lotus *Executive Briefing System* and the *Screen Director* system, *The Slide Show* has no provision for creating slides; rather it is simply a system to take hi-res images created by other software packages and show them in sequence.

A slide sequence may contain up to 75 hi-res images. Although a maximum of 16 images may be stored on one disk, the program works with single or multiple disk drives, so longer sequences can be shown.

The Slide Show provides three methods of advancing slides. For a show under the control of the operator, either the paddle button or a key press may be used to advance the slide. Alternatively, slides can be set to run automatically with the timing of the slide advance set at anything between eight seconds and seventeen minutes. Furthermore, these methods may be intermixed in a slide show.

The manual is divided into five sections. The first section is an introduction and describes the features of the system. The second section takes you step by step through running a demonstration sequence which is included on *The Slide Show* disk.

creative computing

SOFTWARE PROFILE

Name: The Slide Show

Type: Slide show utility

Authors: Bruce A. Cash,
Robert W. Hench

System: 48K Apple, disk drive

Format: Disk

Language: Applesoft Basic

Summary: Electronic slide show

Price: $39.95

Manufacturer:
C & H Video
110 West Caracas Ave.
Hershey, PA 17033

The third section of the manual describes the seven main commands in the menu. They are: Create, Display, Erase, Load, Modify, Print and Save.

The fourth section comprises the bulk of the manual (28 pages). It is a tutorial which takes you through all the features of the system. The balance of the manual consists of six appendices and an addendum.

The Slide Show system is completely menu-driven; the only thing you will ever have to type is the name that you wish to assign to a slide and the file name under which it is currently stored on a disk.

The two commands used most are Create and Display. Create is the option used to create a slide sequence. Upon selecting Create, the program asks you to enter the name of the slide and press RETURN. The name of the slide is the same as the filename of the hi-res image on the disk. The menu then allows you to select the drive number from which the slide will be loaded. Following this, the program prompts you for the type of slide advance to be made from Slide 1 to Slide 2. If you do not select a type of advance, the program will automatically default to a key press of any key. The program then asks you to input the letter for the type of transition between Slide 1 and Slide 2. The 20 transitions available are shown in Figure 1.

The list of transitions is provided as Appendix D in the manual or may be shown on the screen by pressing CONTROL-L. After selecting a transition, Create goes back to Step 1 and asks you for the name of the next slide in the show.

When you have finished the creation process, ESCAPE takes you back to the main menu from which you may select another option.

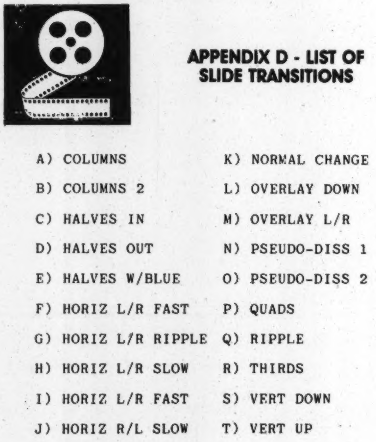
To view the show that you have created, you simply press D for Display. There are no options with the Display command: you simply see the show as you have created it.

The Modify option steps through a show in the following order: slide name, type of slide advance, and type of transition. If you wish to change an item, you simply type over the existing information or use the menu to select a different option.

Save, as its name implies, saves a slide show sequence on a disk. Load brings it back in, and Erase eradicates it from memory (but not from the disk). With the Print option, a slide show sequence may be printed on a line printer. Note that it is the sequence of slides that are printed and not the hi-res images.

The Slide Show package includes three important programs which are external to the menu-driven portion of the system. The Initialize and Copy programs allow a new disk to be initialized and slides to be copied on to it. Using Copy, 16 hi-res slides may be copied on one disk. This is two more than could be "normally" copied using FID or another standard copy program. On the other hand, the images are not packed nearly as densely as they can be with some of the "picture packer" routines.

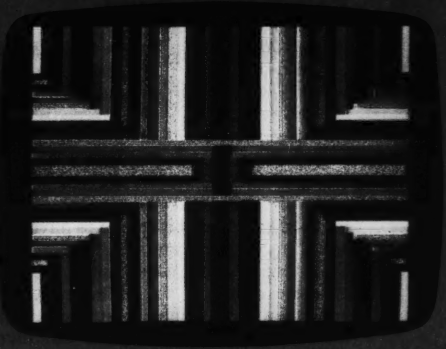
Another program, Create Run-Time, allows a complete slide show along with



APPENDIX D - LIST OF SLIDE TRANSITIONS

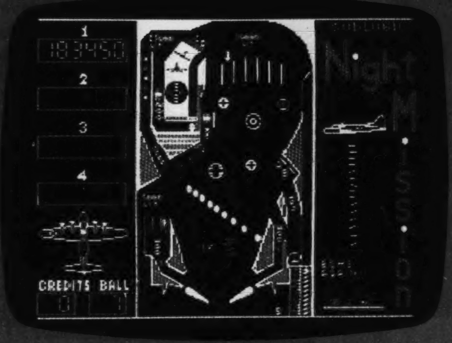
```
A) COLUMNS              K) NORMAL CHANGE
B) COLUMNS 2            L) OVERLAY DOWN
C) HALVES IN            M) OVERLAY L/R
D) HALVES OUT           N) PSEUDO-DISS 1
E) HALVES W/BLUE        O) PSEUDO-DISS 2
F) HORIZ L/R FAST       P) QUADS
G) HORIZ L/R RIPPLE     Q) RIPPLE
H) HORIZ L/R SLOW       R) THIRDS
I) HORIZ L/R FAST       S) VERT DOWN
J) HORIZ R/L SLOW       T) VERT UP
```

Figure 1. List of 20 types of transitions from one slide to the next.



Musician or not, experience the
ultimate in audiovisual pleasure.

Music Maker


1
183450
2
3
4
CREDITS BALL
Night Mission

The maximum in entertainment.
Infinite in variety.

Pinball

SPEED
TURN
ENERGY
MANUAL MISSILE
AUTO LASER
ORBIT COMD
DAMAGE SHIELD
921
144
-4188
341
9

Adventure on a grand scale.

Space Vikings

sub LOGIC
Communications Corp.
713 Edgebrook Drive
Champaign, IL 61820
(217) 359-8482
Telex: 206995

Superlative software.
Don't settle for less.

48K Apple II disk.

See your dealer...
or write for brochures.

"Apple" is the registered trademark of Apple Computer Inc.

CIRCLE 294 ON READER SERVICE CARD

THE PROGRAMMABLE CUBE™

The Programmable Cube is like the popular physical game: it comes in many colors, you can turn its faces and rotate it, you can scramble it and solve it by moving the faces. It even comes with a complete solver for any scrambled cube. But it has an extra twist: it speaks a language especially designed for cubes through which you can write your own cube programs, either to produce fancy patterns or even to solve a scrambled cube with your own cube-solving strategy.

- ■ High resolution graphics, color or black and white, shows all 6 sides and simulates motion.
- ■ Tell it about your scrambled cube—it will lead you through the solution.
- ■ Write your own cube programs: comes with complete programming environment including editor and debugger.
- ■ Available for Apple II® or Apple II Plus®, 48K or 64K.

Apple is a Trademark of Apple Computer, Inc.

How to Order:
Send $34.95,
Check, VISA or
MasterCard to:

METACOMET™
SOFTWARE
P.O. Box 31337, Hartford, CT 06103

Specify 48K or 64K
Conn. residents add 7½% Sales Tax

CIRCLE 205 ON READER SERVICE CARD

Slide Show, continued...

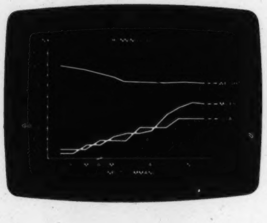
all the display information to be stored on a run-time disk. The Create Run-Time program is menu-driven and very easy to use.

In summary, *The Slide Show* is an easy-to-use package for the creation of an electronic slide show. While it is unlikely that anyone would want to use all 20 transitional effects, it is nice to have such a large selection available. The manual, unfortunately,does not do justice to some of these effects. I would have liked to have seen some screen illustrations in the manual and a summary of the menu commands. Also, the long tutorial section and absence of an index in the manual made the going rather slow.

On the other hand, the menu-driven nature of the system combined with the relatively complete explanations of the allowable commands at any particular point made using the system relatively straightforward and trouble free. I would have liked to see a high density packing routine used for storing images on a disk to allow more than 16 images. Nevertheless, *The Slide Show* meets its goals with nerve and, if you are not looking to create or modify images created with other programs, represents a good buy for $39.95. ☐

CIRCLE 344 ON READER SERVICE CARD

PERSONAL FINANCE For the ATARI* 800



The Scitor* Personal Finance and Record Keeping package provides your home with a sophisticated yet simple automated records system. You can easily organize and keep track of expenses, checks, credit cards, energy utilization, jogging logs, diet and fitness programs, and other personal records. Reports, high resolution graphs, and color bar charts can be generated from the records providing you with insight into expenses, budgets, and progress versus goals. A General Ledger capability is provided allowing use of this package by a small business. In addition, ledger data may be interchanged with VISICALC.**

DEALER INQUIRIES WELCOME

*TRADEMARK OF ATARI INC

**TRADEMARK OF VISICORP

SCITOR
710 LAKEWAY SUITE 290
SUNNYVALE CA 94086
(408) 730 0400

CIRCLE 272 ON READER SERVICE CARD

Electronics Div. Card #1

RUSH THIS POSTAGE-PAID CARD FOR YOUR FREE CATALOG

NO SALESMAN WILL CALL

NEW!

- Computer electronics with new TRS-80 Model III state-of-the-art computer
- TV/Audio/Video servicing with choice of computerized Heath/Zenith color TV, videocassette recorder, or stereo system
- Industrial Electronics for Instrumentation and Control technicians with TRS-80 Color Computer for hands-on training
- Electronic Design Technology with design lab program for creative circuit and equipment design

WE'LL TRAIN YOU FOR THE GOOD JOBS!
NRI HOME TRAINING IN
SMALL ENGINE REPAIR
NRI
Home Training in
Air Conditioning,
NRI HOME TRAINING IN
ELECTRONICS

Name (Please Print) Age

Street

City State Zip

CC

Accredited by the Accrediting Commission of the National Home Study Council

175-112

CHECK ONE:

- ☐ Microcomputers and Microprocessors
- ☐ Color TV, Audio, and Video System Servicing
- ☐ Digital Electronics
- ☐ Electronics Design Technolgy
- ☐ Industrial Electronics
- ☐ Communications Electronics • FCC Licenses • Mobile • Aircraft • Marine
- ☐ Basic Electronics
- ☐ Small Engine Servicing
- ☐ Appliance Servicing
- ☐ Automotive Servicing
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Heating, Refrigeration, & Solar Technology
- ☐ Building Construction

All career courses approved under GI Bill. ☐ Check for facts.

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 10008 WASHINGTON, D.C.

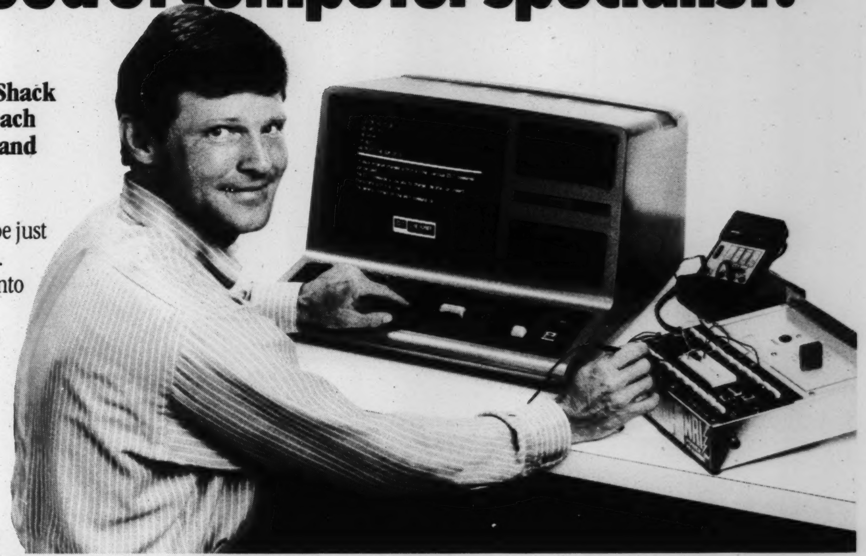
POSTAGE WILL BE PAID BY ADDRESSEE

NRI Schools
McGraw Hill Continuing
Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016

Now NRI takes you inside the new TRS-80 Model III microcomputer to train you at home as the new breed of computer specialist!

NRI teams up with Radio Shack advanced technology to teach you how to use, program and service state-of-the-art microcomputers...

It's no longer enough to be just a programmer or a technician. With microcomputers moving into the fabric of our lives (over 250,000 of the TRS-80™ alone have been sold), interdisciplinary skills are demanded. And NRI can prepare you with the first course of its kind, covering the complete world of the microcomputer.



Learn At Home in Your Spare Time

With NRI training, the programmer gains practical knowledge of hardware, enabling him to design simpler, more effective programs. And, with advanced programming skills, the technician can test and debug systems quickly and easily.

Training includes the TRS-80 Model III microcomputer, professional LCD multimeter, the NRI Discovery Lab, Computer Assisted Instruction programs and hundreds of demonstrations and experiments.

(TRS-80 is a trademark of the Radio Shack division of Tandy Corp.)

Only NRI gives you both kinds of training with the convenience of home study. No classroom pressures, no night school, no gasoline wasted. You learn at your convenience, at your own pace. Yet you're always backed by the NRI staff and your instructor, answering questions and giving you guidance.

You Get Your Own Computer to Learn On and Keep

NRI training is hands-on training with practical experiments and demonstrations. You don't just program your computer, you go inside it...watch how circuits interact...interface with other systems...gain a real insight into its nature.

You also work with an advanced liquid crystal display hand-held multimeter and the NRI Discovery Lab,® performing over 60 separate experiments. Both microcomputer and equipment come as part of your training for you to use and keep.

Computer Assisted Instruction

Your TRS-80 even helps train you. You receive 8 special lesson tapes in BASIC computer language. Using them in your microcomputer, you "talk" to it as you progress. Errors are explained, graphics and animation drive home key points. Within a matter of minutes, you'll be able to write simple programs yourself.

Send for Free Catalog... No Salesman Will Call

Get all the details on this exciting course in NRI's free, 100-page catalog. It shows all equipment, lesson outlines, and facts on other electronics courses such as Electronic Design, Industrial Electronics, TV/Audio/Video Servicing... 11 different career opportunities in all. Keep up with the latest technology as you learn on the latest model of the world's most popular computer. If card has been used, write to:

NRI McGraw-Hill

NRI Schools
McGraw-Hill Continuing
Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016

We'll give you tomorrow.

Apple Flasher

David H. Ahl

Apple Flasher is a software package designed to find and display hi-res pictures which have been stored on disks by other Apple programs.

Hi-res graphic images stored on disks as binary files must be loaded into an area of the memory, normally designated hi-res Page 1 or Page 2, in order to be seen. The normal load routine supplied with Apple DOS takes about 10 seconds to load a hi-res image after the name of the file has been typed by the user. *Apple Flasher* both automates and speeds up this display process. The system is almost entirely menu-driven and requires only one keystroke to execute each command.

After loading the *Apple Flasher* disk, a logo screen is displayed and you are invited to "press any key." The program then asks you to place a picture disk in Drive 1. At this point, you may remove the *Apple Flasher* disk and put it away. On the other hand, if you have two drives, you may press 2 to use Drive 2 instead of Drive 1. Pressing any other key will then read the names of the files into the *Apple Flasher* program.

Once these files have been read in, the menu screen appears showing the names of the files along with a letter (A to P) assigned to each filename.

creative computing

SOFTWARE PROFILE

Name: Apple Flasher

Type: Electronic slide show

Author: Paul W. Mosher

System: 48K Apple, Applesoft, disk drive

Format: Disk

Language: Applesoft Basic

Summary: No-frills slide show

Price: $34.50

Manufacturer:

Crow Ridge Associates, Inc.
P.O. Box 90
New Scotland, NY 12127

The menu then allows you to enter one of three display modes: Scan, Projector, and Auto-Display.

Scan automatically shows in sequence all the pictures in the most recently read disk drive. The pictures are shown for about two seconds each so this is an efficient way to search a disk quickly for a particular picture. The Scan may be halted temporarily by striking any key; it is resumed in the same way.

Striking the space bar during a Scan makes the display show information about the picture on the bottom four lines of the screen. This information consists of the letter that has been assigned to the picture, the filename, and the time in seconds which that picture is to be displayed in the Auto-Display mode.

Projector mode imitates the action of a carousel slide projector. When this mode is selected, the first picture on the disk is displayed. By using either the game paddle buttons or the arrow keys you can move ahead to the next picture or back to the previous one. Paddle Button 0 or the right arrow key moves ahead, while Button 1 or the left arrow key moves backwards.

The Auto-Display mode shows each picture for the amount of time specified in a timing code "hidden" in the name of the file. Using time codes, you can create sequences of pictures that will be displayed for varying lengths of time according to their content. The time interval may be varied between two seconds and four minutes. As in Projector mode, any key will interrupt the display.

Timing codes are put in the picture names with a separate Applesoft program or keyboard routine. This routine is shown in Figure 1. Note that this portion of the *Apple Flasher* system is not menu-driven and requires a fair amount of typing on the part of the user. We are told by Crow Ridge Associates that they will soon be releasing *Showmaker*, a utility for setting up slide shows including an automatic method of placing time marks in the picture files. Nevertheless, I did not find the existing procedure too onerous and found I could make a display disk in about the same amount of time as it took with one of the more sophisticated systems.

On the other hand, in contrast to the *Executive Briefing System* or the *Slide Show*, *Apple Flasher* does not offer the user any choice in transition effects, nor does it offer the ability to create or edit slides.

The manual is skimpy but adequate. The author assumes that the user knows how to use his Apple and create hi-res images.

Unfortunately, no provision is made to put the run-time system and a slide show on a single disk. This would be highly desirable so you could make a show, store it on a disk, and distribute multiple copies to stores, sales people, or other members of your organization. In its favor, *Apple Flasher* is a straightforward, easy-to-use electronic slide show system at a modest price. It is what it claims to be, "a convenient, rapid way to find and display hi-res pictures," in a no-frills package. ☐

CIRCLE 345 ON READER SERVICE CARD

```
(1) Boot with an ordinary DOS 3.3 disk
    Do not use the APPLE FLASHER disk for this process!
(2) Place the disk with the picture in drive 1
(3) Type HGR so you can see screen 1 -- it'll be black
(4) Type BLOAD MYPIC,A$2000 -- you'll see your picture
(5) type FOR N = 8312 TO 8319: POKE N, 0: NEXT
(6) Type Poke 8314, 20 <--this is the number of seconds
(7) Type BSAVE MYPIC,A$2000,L$2000
```

Figure 1. Procedure to put timing codes on slides.

Videx INC.™

897 N.W. Grant Ave. • Corvallis, Oregon 97330 • 503/758-0521

Never having to type the word "CATALOG," or trying to remember how to get from one part of a program to another!

If you could do these functions, and many more like them, at the STROKE of a SINGLE KEY, would you? We thought you would! So, we invented the Enhancer][and the Function Strip. More than just another lower case adapter, the Enhancer][is an intelligent keyboard processor. Now characters, strings of data, commands and statements can all be stored in your Enhancer][for immediate recall by pressing JUST ONE KEY!

Features that you would expect only on larger systems now can be yours. EASILY! For instance, wouldn't you like auto-repeat, and hi-speed repeat? How about a type-ahead buffer? Even user-definable function keys are available for greater input flexibility.

The Videx Enhancer][and Function Strip; it really is the Dawn of a New Era for Apple][™.

Suggested Prices	
ENHANCER][	149.00
FUNCTION STRIP	79.00
Package Deal	215.00

NEC
Videx
Videx
NEC
Videx
Enhancer II
Videx
INTELLIGENT INTERFACE
apple II
apple II
Videx
INTERFACE ACCESSORY
FUNCTION STRIP
apple II
disk II
disk II

Apple][is a registered trademark of Apple Computer, Inc.
Enhancer][and Function Strip are trademarks of Videx, Inc.

CIRCLE 309 ON READER SERVICE CARD

commodore
VICMODEM
F1
F3
F5
F7

THE COMMODORE 64. ONLY $595.
What nobody else can give you at twice the price.

"THE COMMODORE 64 COULD BE THE MICROCOMPUTER INDUSTRY'S OUTSTANDING NEW PRODUCT INTRODUCTION SINCE THE BIRTH OF THIS INDUSTRY."

–SHEARSON/AMERICAN EXPRESS

They're speaking to a group as interested as anyone else in the future of computers: the people who buy stock in the companies that make computers.

If, on the other hand, you're a person whose livelihood depends on a personal computer—or whose leisure time revolves around one—what follows should impress you even more than it impresses investors.

MIGHT MAKES RIGHT.

The value of a computer is determined by what it can do. What it can do is largely determined by its memory.

The Commodore 64's basic RAM is 64K. This amount of power is unusual enough in a micro at any price.

At $595, it is astonishing.

Compared with the Apple II+®, for instance, the Commodore 64™ offers 33% more power at considerably less than 50% of the cost.

Compared with anything else, it's even more impressive.

PILE ON THE PERIPHERALS.

Because the basic cost of the 64 is so low, you can afford to buy more peripherals for it. Like disk drives, printers, and a telephone modem that's priced at around $100.

This means you can own the 64, disk drive, printer and modem for a little more than an Apple II+ computer alone.

HARD FACTS ABOUT SOFTWARE.

The Commodore 64 will have a broad range of custom software packages including an electronic spreadsheet; business graphics (including printout); a user-definable diary/calendar; word processing; mailing lists, and more.

With BASIC as its primary language, it is also PET BASIC compatible.

The Commodore 64 will also be programmable in UCSD PASCAL, PILOT and LOGO.

And, with the added CP/M* option, you will have access to hundreds of exciting software packages.

THE FUN SIDE OF POWER.

The Commodore 64 can become very playful at a moment's notice.

You can use Commodore's plug-in game cartridges or invent your own diversions. All will be enhanced by brilliant video quality (320 x 200 pixels, 16 available colors, 3D Sprite graphics), plus outstanding sound.

The 64's built-in music synthesizer has a programmable ADSR (attack, decay, sustain, release) envelope, 3 voices (each with a 9-octave range) and 4 waveforms. All of which you can hear through your audio system and see in full color as you compose or play back.

NOW'S YOUR CHANCE.

If you've been waiting for the "computer revolution," consider it as having arrived.

Through its 25 years of existence, Commodore has been committed to delivering better products and lower prices.

Today, the company's vertical integration has resulted in the Commodore 64's price performance breakthrough heralded by Shearson/American Express.

Visit a Commodore Computer dealer and discover the 64 soon.

It will expand your mind without deflating your wallet.

*CP/M® is a registered trademark of Digital Research, Inc.

Commodore Business Machines/Personal Systems Division
P.O. Box 500 Conshohocken, Pennsylvania 19428

Please send me more information on the Commodore 64™

Name______________________________

Company______________________________

Address______________________________

City________________ State__________

Zip________________ Phone__________

commodore
COMPUTER

CRC-11

CIRCLE 138 ON READER SERVICE CARD

GREAT
SHOW ON EARTH
GRAND
MAG
LANTERN
DAY
PLACE

Poor Man's Slide Show System

Kerry Shetline

This is a short program in Basic that will do a "slide show" presentation of hi-res pictures on the Apple. Load the program, then insert the disk containing your pictures in Drive 1. Type RUN, and the program asks if you wish to see a catalog of images (slides) on the disk. You are then prompted to type the names of the pictures you want displayed in their proper sequence. Press RETURN without typing a name when you are done. If you make a mistake, enter a "/" instead of a file name and the procedure starts over.

After all the names have been entered, the program automatically starts to load and show the slides.

The program can be controlled by paddles or keyboard. Use the right arrow or Button 1 to advance through the pictures, and the left arrow or Button 0 to move backwards. The program immediately displays the next picture in the sequence when you push the paddle button or arrow key. While that picture is being viewed, the next picture in the sequence will be loaded. You will hear a beep when the load is completed (about 6-10 seconds) and can move on to the next picture at that point. You may stop the program by pressing ESCAPE. ☐

```
100 REM] Creative Computing slide show program, by Kerry Shetline
110 DIM A$(14): B0=49249: B1=B0+1: S1=49236: KB=49152: CKB=49168: L$=CHR$(4)+
    "BLOAD ": S$(0)=",A$2000": S$(1)=",A$4000"
120 ONERR GOTO 290
130 DEF FNP(X)=X-1+(P+1)*(NOT X): DEF FNF(X)=X+1-(P+1)*(X=P)
140 TEXT: HOME: PRINT: PRINT: INPUT "DO YOU WISH TO SEE THE CATALOG?";R$:
    IF LEFT$(R$,1)="Y" THEN
      PRINT: PRINT CHR$(4)"CATALOG"
150 PRINT: PRINT "ENTER THE NAMES OF THE PICTURES:": PRINT
160 FOR P=0 TO 14:
      PRINT "PICTURE #" CHR$(32*(P<9));P+1;: INPUT A$(P):
      IF A$(P)="" THEN 190
170   IF A$(P)="/" THEN 140
180 NEXT P
190 P=P-1: HGR: POKE 49234,0: D=0: S=0: PN=0: PRINT L$;A$(0);S$(0): PRINT L$;
    A$(1);S$(1)
200 PRINT CHR$(7): POKE CKB,0
210 K=PEEK(KBD):
    IF PEEK(B1)>127 OR K=149 THEN 270
220 IF PEEK(B0)>127 OR K=136 THEN 250
230 IF K=155 THEN
      POKE CKB,0: TEXT: HOME: END
240 GOTO 210
250 PN=FNP(PN):
    IF D THEN
      S=NOT S: POKE S1+S,0: PRINT L$;A$(FNP(PN));S$(NOT S): GOTO 200
260 D=NOT D: PRINT L$;A$(PN);S$(S): PRINT L$;A$(FNP(PN));S$(NOT S): GOTO 200
270 PN=FNF(PN):
    IF NOT D THEN
      S=NOT S: POKE S1+S,0: PRINT L$;A$(FNF(PN));S$(NOT S): GOTO 200
280 D=NOT D: PRINT L$;A$(PN);S$(S): PRINT L$;A$(FNF(PN));S$(NOT S): GOTO 200
290 TEXT: HOME:
    IF PEEK(222)<>255 THEN
      VTAB 12: INVERSE: PRINT TAB(16) CHR$(7)"DOS ERROR!" SPC(15): NORMAL:
      FOR X=1 TO 2000:
      NEXT X:
      GOTO 140
```

JIGSAW...A Mind Teaser

The First Computerized Jigsaw Puzzle

Spend fascinating, intriguing, challenging hours
of endless, hi-res entertainment... with JIGSAW.
Great for anyone and everyone.

Take your favorite computer picture and convert it into a puzzle. The program comes with 7 supplied pictures (full-color, hi-res graphics). Each puzzle breaks apart into 180 separate pieces. Never repeats the same sequence of shapes–each game you randomly generate a brand-new puzzle.

The pictures supplied by JIGSAW are designed for players of all skill levels. Total program written in machine language, permits fast loading, quick picture generation, rapid response. A super teaching aid for young people (for size, color, and shape relationships).

CAUTION: PLAYING JIGSAW MAY BE HAZARDOUS TO YOUR HEALTH.
The fun and excitement are infectious and you'll spend hours in front of your computer!

This Program was Written by Joe Calabrese. JIGSAW requires Apple II, 48K. Now available at your local dealer.

micro fun™
entertainment division of micro lab

APPLE is a registered trademark of Apple Computer, Inc.

CIRCLE 312 ON READER SERVICE CARD

Copyright 1982 Microfun.

ZENITH
WANG
apple
HEWLETT PACKARD
hp
IBM

Look Who Picked the Peach.

Did You?

They did.

And perhaps you did too. If you own an IBM Personal Computer,™ an Apple III,™ a Zenith Z-89™ or a Hewlett-Packard HP-87,™ you've had the chance to pick Peachware.™ All these companies chose Peachtree Software™ to get the most out of their machines for you.

And with good reason. Peachtree Software is the recognized leader in business software for microcomputers, with a reputation for comprehensive, well-designed packages, easy-to-use documentation and Peachcare™—our own array of support services unmatched in the industry.

With integrated systems like the Peachpak™ 8 Accounting Series—General Ledger, Accounts Payable, Accounts Receivable, Sales Invoicing, Inventory Control and PeachPay™ Payroll—Peachtree offers the manager unprecedented control over his critical accounting activities. And the Peachpak 9 Office Productivity Series, based on the PeachText™* word processor and including the PeachCalc™ Electronic Spreadsheet, Spelling Proofreader, Mailing List Manager and Telecommunications, expands the power of Peachtree Software to all areas of the office.

Those qualities made our software the natural choice of these big manufacturers. But they're not the only ones who've picked a peach. So have tens of thousands of individual users of the better CP/M™—compatible microcomputers.

If you haven't picked the Peach, isn't it about time you did?

*We improved Magic Wand,™ and it's so good we put our name on it.

IBM is a trademark of International Business Machines Corp.

Apple III is a trademark of Apple Computer Inc.

Z-89 is a trademark of Zenith Corporation.

HP-87 is a trademark of Hewlett-Packard Company.

CP/M is a trademark of Digital Research Inc.

Peachware, Peachtree Software, Peachcare, Peachpak, PeachPay, PeachText and PeachCalc are trademarks of Peachtree Software Incorporated, an MSA Company.

Copyright © 1982 Peachtree Software Incorporated, an MSA Company.

Please send me information on Peachware™ by Peachtree Software.

CC 1182

Name:______________________________

Company:______________________________

Address:______________________________

City:________________ State:______ Zip:__________

I am a: ☐ prospective dealer ☐ user of software

Peachtree Software Incorporated an MSA company
3445 Peachtree Road, N.E. / 8th Floor / Atlanta, Georgia 30326 / (404) 239-2045

Peachtree Software

CIRCLE 242 ON READER SERVICE CARD

A game of ups and downs, with a laugh at every floor!

Quick! Run to the hotel lobby! Grab the luggage! Race to the penthouse! Rush back for more! Everybody's in a hurry, and the tips keep running out! No time to waste—no time even to wait for the elevator. You only have time for laughing, chuckling, chortling and a giggle or two. (Oops—look out for that luggage-stealing Hotel Ghost!)

Your time's running out, but the fun never does. Pack your game bag with BELLHOP, family fun from Hayden Software.

to order call:
1-800-631-0856
(In N.J. call 201-843-0550, ext. 382)
BELLHOP, #19109, Apple II disk, $34.95

HAYDEN SOFTWARE

CIRCLE 182 ON READER SERVICE CARD

Micro-Dynamo

WORLD POPULATION
ECONOMICS
BUSINE
GOVERNMENT
HEALTH CARE
CFD

A Language for Simulating the World

creative computing
SOFTWARE PROFILE

Name: Micro-Dynamo
Type: Model-building language
System: Apple II, two disk drives, language or RAM card and Pascal
Format: Disk and 114-page manual
Summary: Builds and runs complex, multi-equation models of business, environment, economics, health care, the world, etc.
Price: $245
Manufacturer:
Addison-Wesley Publishing Company
Jacob Way
Reading, MA 01867

Christopher U. Light

Perhaps the first attempt at building a mathematical model of the economy was Thomas Malthus's observation in 1798 that the population of the world was growing geometrically while the food supply could grow only arithmetically.

If the number of people were to double every 25 years (1...2...4...8...16 ...32...) and the amount of food produced were to grow at a linear rate (1... 2...3...4...5...6...) every quarter century, Malthus pointed out, in time there simply wouldn't be enough food to feed all the people. The inevitable result: widespread starvation, misery, poverty, war, famine and pestilence. This conclusion lead Thomas Carlyle to dub economics "the dismal science," a sobriquet it has yet to outgrow.

Malthus's prediction was not fulfilled — at least in the short run — in part because he couldn't foresee the great advances in technology that would happen in the next two centuries. In essence, his model was very incomplete and would remain so until the invention of the computer.

His work, however, was never forgotten. Thoughtful people have long been aware that the world's resources are finite and may someday be used up. A decade ago two events based on this realization shocked the world.

The second of these was the 1973 OPEC embargo on oil and subsequent doubling, tripling and quadrupling of its price. This followed by little more than a year the publication of the first "doomsday" study to use modern model-building and computation techniques.

Sponsored by the Club of Rome and entitled the *Limits to Growth*, this study attempted nothing less than to model mathematically the entire world using who knows how many variables and equations — birth rates, fertility rates, land available for cultivation, industrial output, pollution, capital formation — and the interaction and feedback loops between these variables.

Although the final model reported in the book examined only five major variables, these were actually summary variables produced by submodels and were based on consideration of hundreds of factors. It was a staggering project which required the power of the biggest computers of its day.

The results are well known: no matter how the authors varied their assumptions within reason, each simulation run predicted that, unless mankind could develop conservation measures immediately, sometime in the early to middle part of the 21st

---

Christopher U. Light, 919 North Michigan Ave, Suite 3008, Chicago, IL 60611.

century the world's resources would simply be insufficient to support its ever growing population. The result: poverty, famine, war, misery and a rapid decline in the total population caused by deaths due to these factors.

The technique of forecasting changes in complete systems with variables that impinge upon and interact with each other, is called "system dynamics," and a language called Dynamo for what were then considered giant mainframe computers such as the IBM 360 was developed in 1958 by Alexander Pugh and others working with him.

Later it was made interactive and revised for the mini-computer.

Micro-Dynamo is a rewriting of it in Pascal for the Apple.

Writing and Running the Model

Although the manual for *Micro-Dynamo* is subtitled "System Dynamics Modeling Language," the complete Pascal/Dynamo package is far more than just another language. It contains the essential elements of a word processor and includes many menu-driven prompts that require only one-key responses.

In brief, the steps in writing and running a model that will plot over time four variables in four colors simultaneously on a color monitor or print a plot of 10 variables at a time on a printer are:

1) Hit E, so the command menu will run the editor, and then type in your program.

2) Hit Q so the editor menu will present its save menu.

3) Hit W to write your program on a disk with the name you give it.

4) Hit E to exit the editor.

5) Hit L (for linker) to call the compiler.

6) When prompted, re-enter the name of your file.

7) Wait while your program is compiled and error messages are printed out.

8) Return to the editor, correct the errors if necessary and repeat the above steps, or, if no corrections are needed, simply wait while your program is run and the predicted values of all of your designated variables are first listed numerically and then plotted.

If you hit Reset or Escape at the wrong time, you'll curse a blue streak, but otherwise error-trapping seems just fine.

So that is the system itself — similar to a word processor except that it deals in equations and also runs a program. The language in which you write your program is not especially difficult to learn, but it is neither Basic nor Fortran and has some surprises for programmers familiar with those two.

Dynamo is a very specialized, single purpose language whose only function is to make it easy for a model-builder to enter and run a dynamic model (one in which all variables except constants are mathematical functions of time). While this specialization does, of course, reduce its versatility, it also means that the unexpected occurs less often and the language can be learned quickly.

An experienced Apple user who is familiar with either Basic or Fortran and also with model-building should need only a day or two to grasp both the language and its editor/printer system.

Modelling Malthus

Perhaps the best way to discuss *Micro-Dynamo* as a programming language is with an illustration. Because most of the examples that come with the package are long and complicated (Jay Forrester's World Dynamics model, for example), let's write a little program using Malthus's observations.

Let's assume, as he incorrectly did, that the population of Great Britain is 15 million and that it is doubling every 25 years (which is an annual compound growth rate of about 3%).

Let's assume that food production grows by 5% of its initial amount every year. At the end of 25 years, it will be 125% higher, while the population will have doubled.

Let's also assume that all of the British farmers in 1798 could grow enough food to provide 3000 calories a day for each of the 15 million people, but that each person requires 2000 calories a day. In other words, there is a surplus of food in time zero (1798), but with the population growing exponentially and food production linearly, the annual surpluses will become shortages at some point in the future. Question: in what year will this happen.

To find out, we have written a short program in *Micro-Dynamo* that appears in Listing 1. As you study the program, probably the first thing you will notice is that there are no line numbers. *Micro-Dynamo* does not use line numbers because you can enter the lines in any order and the language will sort them in memory so that they will be in the correct order when the program is run.

The second thing you will note is that there is no asterisk between (DESPOP.K) and (RATE) in line 3. Although *Micro-Dynamo* does recognize the asterisk as a multiplication sign, and requires it if there are no parentheses, it also accepts back to back parentheses as a command to multiply their contents.

In place of line numbers, this language uses the first few columns (up to the first space) to indicate the kind of instructions the line contains. The asterisk in line 1, for example, makes that line the title that will be printed at the head of the graph.

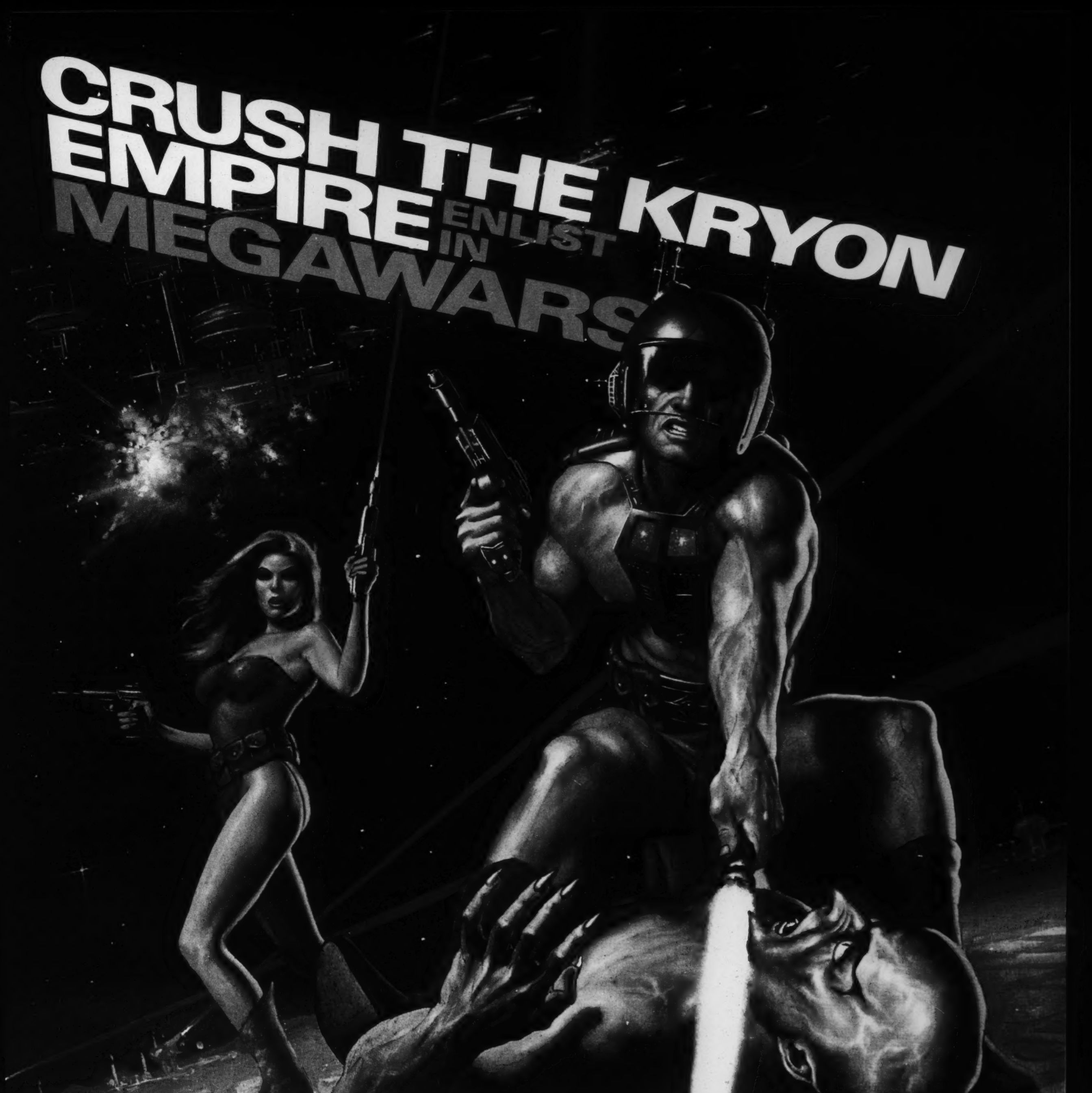
In the second line, L indicates a line defining a difference equation for a *level* (a stock that is constant at a point in time but which changes over time), while R indicates a *rate* (a flow over time that changes the level of the stocks). Think of water flowing into or out of a bucket at some rate per minute but which is at a certain level in the bucket if measured at a given time.

The letter C indicates that the line sets the value of a *constant*, while A stands for *auxiliary* and is used for equations that have the same time period on both sides.

PRINT tells which variables should have their values printed. PLOT does the same thing for a graph. And SPEC sets certain *specifications* including the number of time periods the program is to compute.

Listing 1.

```
*         MALTHUSIAN POPULATION GROWTH
NOTE
L         DESPOP.K=DESPOP.J+(DT)*(NEWPOP.JK)
R         NEWPOP.KL=(DESPOP.K)(RATE)
C         RATE=.03 GROWTH RATE
L         CAL.K=CAL.J+(DT)(.05*ICAL)
C         ICAL=45000
N         CAL=ICAL
A         CALPOP.K=CAL.K/2000
N         DESPOP=15
NOTE         POPULATION IN MILLIONS
A         POP.K=MIN(DESPOP.K,CALPOP.K)
PRINT     DESPOP,CAL,POP
PLOT      DESPOP=D,POP=P(0,300)/CAL=C(40E03,300E03)
SPEC      DT=1/PLTPER=10/PRTPER=10/LENGTH=100
RUN
```



THE ULTIMATE COMPUTER CONFLICT

MegaWars, a real-time space battle between the forces of the Colonists and the Kryon Empire. Join an intergalactic shootout with up to eight starship commanders transmitting orders from the keyboard cockpits of their craft anywhere in the U.S.A.

Attacking, evading, scanning, communicating. That's MegaWars. Easy to learn but difficult to master. That's why CompuServe will give one free hour to every MegaWars player entering a game before December 31, 1982.

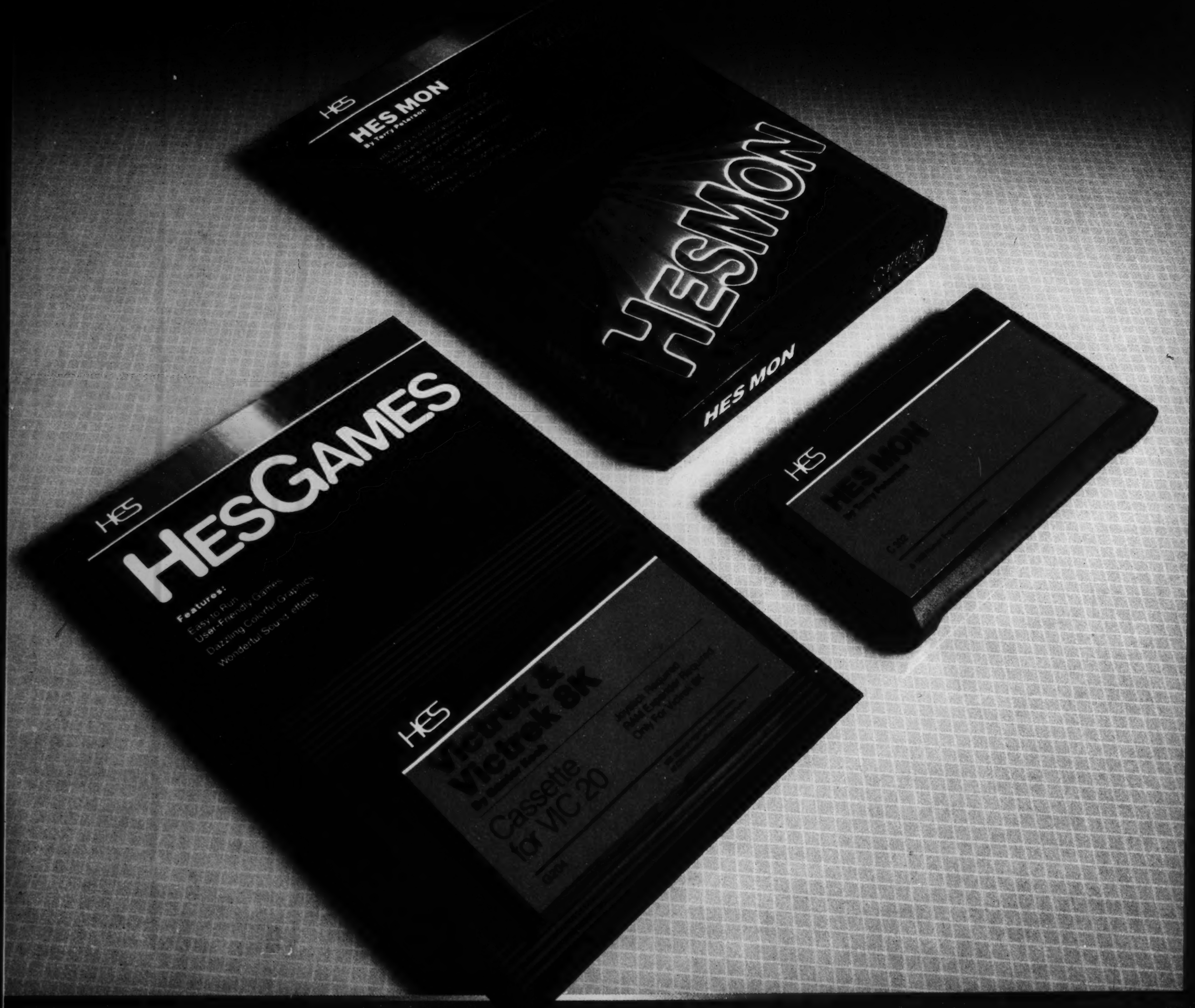
Call toll free 800-848-8990. You'll receive the illustrated guide to CompuServe, America's most comprehensive Videotex service, plus the MegaWars Commanders Briefing.

CompuServe

5000 Arlington Centre Blvd.
Columbus, Ohio 43220
800-848-8990

CIRCLE 139 ON READER SERVICE CARD

Your VIC 20 never had it so good!


HES
HES MON
By Terry Peterson
HESMON
HES MON
HES
HESGAMES
Features:
Easy to Run
User-Friendly Games
Dazzling Colorful Graphics
Wonderful Sound effects
HES
Victrek &
Victrek 8k
Cassette for VIC 20
HES
HES MON

VIC 20 owners rejoice! HES presents a complete range of software from our exciting series of games to our professional group of utility and language programs.

Our new cartridge programs include: HES MON, an indispensible monitor for assembly language programmers; HES WRITER, a word processing program; Turtle Graphics, a fun and easy way to learn computer programming; and VIC FORTH, a powerful language that is many times faster than BASIC, yet easier to use than assembly language.

HES is committed to offering high-quality, well-documented computer programs on a continual basis. Look for our cartridge and cassette based software at your local dealer.

HES

Human Engineered Software
71 Park Lane
Brisbane, California 94005
Telephone 415-468-4110

CIRCLE 184 ON READER SERVICE CARD

Letters following a dot are *timescripts*, subscripts indicating time periods. There are only three: J is the previous time period; K the one the program is calculating currently, and L is the next one. Double timescripts (.KL, for example) indicate that that variable doesn't change between those two time periods.

Now study the example in Listing 1. The first L line says that the desired population (that produced by unchecked growth and thus presumably desired by the parents of the children, hence the variable name) in any given year is equal to its value in the previous year plus the new population per time period multiplied by the number of time periods between each computation (DT which is, in this model, one year).

The next line, R, states that next year's new population will be equal to this year's total population times the annual growth rate. The constant line following sets that growth rate at 3% a year; the term "growth rate" that follows is one of the permissible ways of making a remark.

The following line is like the first and states that the total number of calories available to feed the population is the same as last year plus the new production which is 5% of the initial value each year. ICAL sets the initial daily average food production for Great Britain at 45,000 million calories or 3000 per day per capita.

The letter N that begins the next line signifies that the information in the line initializes some variable. In this case CAL — with no subscript — is given its initial value in time period zero.

The auxiliary line that follows determines the population that can be fed if each person requires 2000 calories a day.

Another initializing line sets the beginning population at 15 (in millions), while the line beginning with NOTE is a third way of making a remark.

The next line illustrates one of the logical operators of the language. In this case the actual (or maximum possible) population equals the lower (minimum) of the unchecked population, DESPOP, or the population that can be fed, CALPOP.

The PRINT line says to print values of the unchecked population, the total food available measured in calories per day, and the actual population.

PLOT says to use D when plotting DESPOP on a daisy wheel printer, P for POP and C for CAL and to set the bottom and top scales of the graph at 0 and 300 for the first two and at 40 thousand and 300 thousand for the third.

The specification line sets the basic time interval as one period (one year), but plots and prints points every ten years for a total of 100 years . . . Whew!

When the program is run, *Micro-Dynamo* sorts the equations into a usable order (to get the initial values at the beginning, for example), compiles the program and searches for errors, computes the values of the variables time period by time period, prints them on the screen and finally plots in hi-res color a graph of these values.

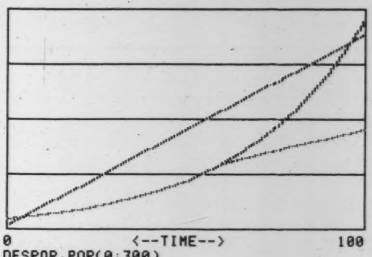


Figure 1. Graph of Malthus's "dismal" model.

The graph for our little Malthusian model is shown in Figure 1. On it the straight line above the other lines is average daily total food available (in thousands of millions of calories) each year for 100 years. The curved line beginning near the origin and disappearing off the graph at the top is unchecked population. Superimposed on this curved line for part of its distance and then branching off to the right below it is actual (or maximum possible) population, which is the lower of the unchecked population or the number of people that could be fed.

After running the program and producing its plots, *Micro-Dynamo* asks if you would like to change any of the parameters and rerun it. We could, for example, set the initial population at 10 million, graph two centuries instead of one and change the scale of the graph — and we could do all of this directly from the keyboard during the rerun phase.

The program would then be run again with the new values but without having to be compiled anew. Only if the structure of the model is changed is it necessary to return to the editor and then recompile to make the alterations.

History Updated

At Addison-Wesley, I had the opportunity to briefly use *Micro-Dynamo*. Having run some of the first articles on Dynamo in the November 1974 and March 1975 issues of *Creative Computing*, I was curious to see how far dynamic modeling had come in the last eight years.

In 1973, Pugh-Roberts Associates released Dynamo, a compile-and-go processor. In the March '75 article, Jay Anderson of Bryn Mawr found that Dynamo was somewhat cumbersome and slow for classroom use. He recommended using a "recipe" for translating System Dynamics models or existing Dynamo programs into Fortran IV. Although it required more programming effort, the result was a program that was more transportable and which ran much faster.

With *Micro-Dynamo* on the Apple, the transportability problem has been largely solved. However, the speed problem has not. Forrester's World Model, admittedly a large model with 249 statements, took 5.2 minutes to load, 4.1 minutes to "reorder" the equations and a few seconds more to display the results.

One particularly unfriendly aspect of the software is that in some places it expects a Return after an input and in other places it doesn't. By itself this would not be horrible except that in certain places a Return is interpreted as no response. For example, to load a model, you should type:

L (no return)
MODEL NAME (Return)

If you type, as I did:

L (Return)
MODEL NAME (Return)

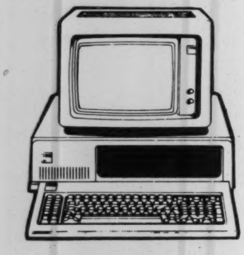
the program assumes that the Return after the L means no model name is to be loaded and it terminates. Yes, terminates. That puts you back into Apple Pascal and you must start over from scratch.

On the bright side, once your model is loaded correctly and the equations reordered, new model conditions (not equations), may be input reasonably easily and executed reasonably quickly. Coupled with the forthcoming book from Addison-Wesley, *Micro-Dynamo* is an excellent system, particularly for educational and scientific environments. — *DHA*

The Choice of

Computer Exchange — The IBM-PC Supply Center

IBM
PERSONAL COMPUTER



HARDWARE for the IBM-PC

		LIST PRICE	OUR PRICE
AST RESEARCH, Combo Plus, 64K with one option.	NEW!	$ 495	$379
Combo Plus, 256K with one option.	NEW!	$1095	$729
Options: Async. Comm. Port., Para. Printer Port., Clock/Calender			
Add $80 for second option and $55 for third.			
Parity Memory Card, 64K		$ 395	$279
256K		$ 995	$659
Note: All of above cards are memory upgradeable.			
BYAD INC., DS1, Z80B for CP/M-80		$ 660	$570
DS2, above with serial port, (Sept)		$ 760	$660
CORVUS, Hard Disk System, See Corvus Section This Page.			
CURTIS, PC Pedestal, T.M. for Display on PC		$ 80	$ 65
3 Foot Cable for IBM Mono Display		$ 50	$ 39
DAVONG, DS1-501 Hard Disk, 5 Meg		$1995	Call
64K RAM Card		$ 299	Call
256K RAM Card		$ 799	Call
★ **MICROSOFT**, 64K RAM Card w/Parity, RAM Drive & Utility		$ 350	$259
128K RAM Card w/Parity, RAM Drive & Utility		$ 525	$395
256K RAM Card w/Parity, RAM Drive & Utility		$ 875	$659
64K RAM Chips T.M. w/Parity, RAM Drive & Utility		$ 175	$129
★ **QUADRAM CORPORATION**			
Quadboard, 64K expandable to 256K, 4 function board		$ 595	$449
256K, four function board		$ 995	$689
Microfazer or Interfazer			Call
TG PRODUCTS, Joystick.		$ 65	$ 49
TANDON, Disk Drives			
TM100-1 Single Sided 160K			Call
TM100-2 Double Sided 320K			Call
VISTA COMPUTER, 576K Maxicard		$1395	$1195
XEDEX, Baby Blue, 64K plus CP/M operation		$ 600	$495

SOFTWARE for the IBM-PC

BUSINESS

		LIST PRICE	OUR PRICE
ASHTON-TATE, dBase II	NEW!	Call on availability	
COMSHARE TARGET, Target Planner Calc		$ 50	$ 39
DENVER SOFTWARE, Easy (Executive Accounting System)		$ 725	$545
INFORMATION UNLIMITED, Easywriter II (a WPS)		$ 350	$259
Easyspeller (88K Words)		$ 175	$129
Easyfiler (a DBMS)		$ 400	$299
INNOVATIVE SOFTWARE, T.I.M. III (a DBMS)		$ 495	$369
★ **INSOFT**, Data Design (a DBMS)	NEW!	$ 225	$169
INNOVATIVE, Spell Guard		$ 295	$220
ISM, MatheMagic		$ 90	$ 69
MICRO LAB, The Tax Manager		$ 250	$189
★ **MICROPRO**, WordStar® plus free WordStar Training Manual		$ 495	$249
MailMerge T.M.		$ 150	$ 79
SpellStar T.M.		$ 250	$149
Special! All Three Above, WordPac		$ 895	$459
WordStar Training Manual		—	$ 25
MICROSOFT, Multiplan (uses MSDOS)		$ 275	$199
PERFECT SOFTWARE, Perfect Writer T.M.		$ 389	$239
Perfect Speller T.M.		$ 189	$119
Perfect Filer T.M.		$ 289	$179
SELECT INFO., Select (a WPS)		$ 595	$375
SORCIM, SuperCalc		$ 295	$219
SuperWriter, call on availability		$ 395	$295
Spell Guard, call on availability			Call
VISICORP, VisiCalc®/256K		$ 250	$189
VisiDex		$ 250	$199
VisiTrend/Plot		$ 300	$239
VisiFile		$ 250	$199
Desktop Plan		$ 300	$239

UTILITY

	LIST PRICE	OUR PRICE
NAGY SYSTEM, Copy/PC, Backup Copier and Utilities	$ 35	$ 29
NORELL DATA, T.M. System-Backup, Bit Copier	$ 50	$ 39

HOME & EDUCATIONAL

	LIST PRICE	OUR PRICE
ACORN, Lost Colony	$ 30	$ 24
AUTOMATED SIMULATIONS, Temple of Apshai	$ 40	$ 29
AVALON HILL, Galaxy	$ 25	$ 20
Midway Campaign	$ 21	$ 17
Computer Stocks and Bonds	$ 25	$ 20
Voyager	$ 25	$ 20
Draw Poker	$ 21	$ 17
CONTINENTAL, The Home Accountant Plus	$ 90	$112
DAVIDSON, The Speed Reader	$ 75	$ 55
INFOCOM, Deadline	$ 50	$ 39
Zork I	$ 40	$ 29
Zork II	$ 40	$ 29
ON-LINE SYSTEMS, Frogger	$ 35	$ 26
SIRIUS, Conquest	$ 30	$ 23

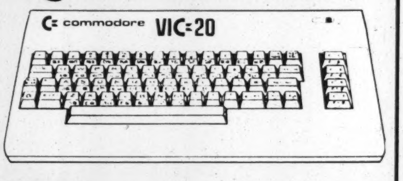
8" CP/M BUSINESS & DEVELOPMENT SOFTWARE

	LIST PRICE	OUR PRICE
ADVENTURE, Adventure's #1 to #12 inclusive, 8"	$ 129	$ 95
ASHION-TATE, dBase II, 8"	$ 700	$495
COMSHARE TARGET, Target PlannerCalc	$ 50	$ 39
FOX & GELLER, Quickcode for dBase II	$ 299	$249
Quickscreen for dBase II	$ 149	$129
dUtil for dBase II	$ 99	$ 75
INFOCOM, Deadline, 8"	$ 60	$ 45
Zork I, 8"	$ 50	$ 39
Zork II, 8"	$ 50	$ 39
INNOVATIVE, Spellguard, 8"	$ 295	$220
ISM, MatheMagic	$ 100	$ 75
MICROCRAFT, Legal Billing & Time Keeping	$ 750	$395
Prof. Billing & Time Keeping	$ 750	$395
★ **MICROPRO**, WordStar® plus free WordStar Training Manual	$ 495	$249
MailMerge T.M.	$ 150	$ 79
SpellStar T.M.	$ 250	$149
Special! All Three Above, WordPac	$ 895	$459
WordStar T.M. Training Manual	—	$ 25
DataStar T.M.	$ 350	$199
SuperSort T.M.	$ 250	$150
CalcStar T.M.	$ 350	$180
Special! All Three Above, DataPac	$ 695	$359
MICROSOFT, Multiplan (uses MSDOS)	$ 275	$199
OASIS, The Word Plus (a WPS)	$ 150	Call
MICROSOFT, Fortran-80, 8"	$ 500	$325
BASIC Compiler, 8"	$ 395	$295
COBOL-80, 8"	$ 750	$545
BASIC-80, 8"	$ 350	$275
PEACHTREE, Magic Wand, 8"	$ 500	$350
GL, A/R, A/P or Inventory, 8"	$ 750	$495
PERFECT SOFTWARE, Perfect Writer T.M.	$ 389	$239
Perfect Speller T.M.	$ 189	$119
Perfect Speller T.M.	$ 289	$179
QUALITY, GBS with 3 generators, (a DBMS)	$ 700	$525
SELECT INFO., Select (a WPS)	$ 595	$375
SORCIM, SuperCalc	$ 295	$219
Super Writer, call on availability	$ 395	$295
Spell Guard, call on availability	$ 295	Call

HEWLETT PACKARD

		LIST PRICE	OUR PRICE
H/P 85A Microcomputer	Limited Special	$2750	$1699
H/P 87A Microcomputer	Limited Special	$2495	$1599
H/P 125 Microcomputer	Limited Special	$2750	$1699
H/P 7225A Professional Plotter	Limited Special	$2750	$1699
H/P 8290B Serial Printer	Limited Special	$ 945	$599
H/P 7470A Graphics Plotter	New!	$1550	$1125
H/P 41C Calculator		$ 250	$185
H/P 41CV Calculator with 2.2K Memory		$ 325	$245
H/P 41 Card Reader		$ 215	$175
H/P 41 Optical Wand		$ 125	$ 99
Wide variety of software and accessories available.			Call

commodore



VIC 20 Home Computer	$300	$229
Datasette VIC 1530	$ 75	$ 59
Disk Drive VIC 1540	$ 600	$479
Super Expander VID 1211A 3K with lots of extras	$ 70	$ 56
3K Memory Expander Cartridge	$ 40	$ 29
8K Memory Expander Cartridge	$ 60	$ 48
16K Memory Expander Cartridge	$ 159	$115
VIC Modem, Telephone Interface	$ 120	$ 96
Joystick	$ 10	$ 8
Game Paddle Pair	$ 20	$ 15

Software full line in stock. Call

PRINTERS, Daisy Wheel

★ **QUME**, Sprint 9, 45 Cps. RO	Limited SPECIAL!	$2660	$1660
Sprint 5, 45 Cps. RO	Limited SPECIAL!	$2995	$1795

PRINTERS, Impact

EPSON. See Epson section below			
IDS, Prism 132, Color w/Graphics		$1995	$1549
Prism 80, Color, w/Graphics		$1795	$1450
★ Pager Tiger 445C, w/Graphics & 2K	Limited Special!	$ 895	$495
Microprism 480, near letter quality		$ 799	$699
OKIDATA, Microline 82A, 120 Cps. 80 Col. Para & Serial		$ 649	$495

EPSON PRINTERS & ACCESSORIES

MX80 x/Graftrax + (to be discontinued by Epson)	$ 645	$445
MX80 F/T w/Graftrax +	$ 745	$525
MX100 F/T w/Graftrax +	$ 995	$695
Cable, IBM-PC to MX80, 80FT or 100	$ 60	$ 45

Apple, Atari, CP/M, IBM, VisiCalc, WordStar, and Z80 are registered trademarks of Apple Computer, Inc., Warner Communications Co., Digital Research, Inc., International Business Machines Corp., VisiCorp Inc., MicroPro International Corp., and Zilog Inc. respectively. MicroPro, MailMerge, SpellStar, DataStar, SuperSort and CalcStar are trademarks of MicroPro International Corp. Insoft and Data Design are trademarks of Insoft, Inc. RAMCard, Microsoft, Multiplan and MS are trademarks of Microsoft Corporation. Videx and Videoterm are trademarks of Videx, Inc. VisiCorp, VisiDex, VisiTrend/Plot, VisiFile and Desktop Plan are trademarks of VisiCorp, Inc. VIC20 is a trademark of Commodore

CORVUS SYSTEMS

	LIST PRICE	OUR PRICE
6 Meg Hard Disk	$2995	$2495
11 Meg Hard Disk	$4795	$3995
20 Meg Hard Disk	$5795	$4795
IBM PC Interface (IBM DOS), Manual & Cable 5'	$ 300	$239
Mirror built-in for easy backup	$ 790	$649
Apple Interface, Manual & Cable 5'	$ 300	$239

Other Interfaces, Omni-Net, Constellation, Mirror. All in Stock.

MONITORS

	LIST PRICE	OUR PRICE
NEC, 12" Green	$ 249	$159
12" Color, Composite	$ 450	$349
SANYO, 9" B&W	$ 190	$149
★ 9" Green	$ 200	$119
12" B&W	$ 250	$199
12" Green	$ 260	$199
13" Color, Composite	$ 470	$349
13" Color RGB	$ 995	$795
Monitor Stand	$ 50	$ 39
ZENITH, 12" Green	$ 150	$119
AMDEK, 12" Green #300	$ 200	$159
13" Color I, Composite	$ 449	$359
13" Color IIA, RGB, Hi Res, (Ap II, III & IBM-PC)	$ 999	$799
13" Color III, RGB, Commercial, (Ap II, III)	$ 569	$469
DVM, Color II or III to Apple II Interface	$ 199	$175

Note: Color II and III come with cable for IBM-PC.

DISKETTES

★Control Data Corporation 12 for 10 Special. Limited Time!

CDC, 120 each, 5¼ with ring, SS, SD (Apple, IBM, etc.)	$ 450	$195
12 each, 5¼, with ring, SS, SD (Apple, IBM, etc.)	$ 40	$ 22
12 each, 5¼, with ring, SS, DD (H/P, IBM, etc.)	$ 51	$ 28
12 each 8", SS, SD	$ 51	$ 28
10 each, 5¼ with ring, DS, DD (IBM)	$ 50	$ 39
VERBATIM, 10 each 5¼, with ring, SS, SD or SS, DD	$ 50	$ 28
MAXELL, 10 each 5¼, SS, SD	$ 55	$ 35
DYSAN, 10 each 5¼, SS, SD	$ 55	$ 39
10 each 5, DS, DD	$ 65	$ 49

OTHER CALLS
(503) 772-3803

VISA

Portland, OR, Cash & Carry Outlet, 11507-D SW Pacific Hwy., Terrace Shopping Center, Tigard, OR, over-the-counter sales only. On 99W between Rte. 217 and Interstate 5. Call 245-1020.

NATIONAL ORDER DESK TOLL FREE
(800) 547-1289
OREGON ORDERS: 772-3256

ORDERING INFORMATION AND TERMS: All Mail: P.O. Box 1380, Jacksonville, OR 97530. We ship immediately on Cashier Checks, Money Orders, Fortune 1000 Checks, and Government Checks. Personal Checks and Company Checks allow 20 days to clear. Add 3% for VISA or MC. Add 3% for shipping, insurance and handling (minimum $5). UPS ground is standard. Add 10% more for US Postal, APO or FPO. Include telephone no. No COD. Prices subject to change and typographic errors, so call to verify. All goods are new, include factory warranty, and are guaranteed to work. Due to our low prices all sales are final. Call before returning goods for repair or replacement. ORDER DESK HOURS: 8 to 6 PST, M-F. 10 to 4 Sat. & Sun. 1 p.m. here is 4 p.m. in NY.

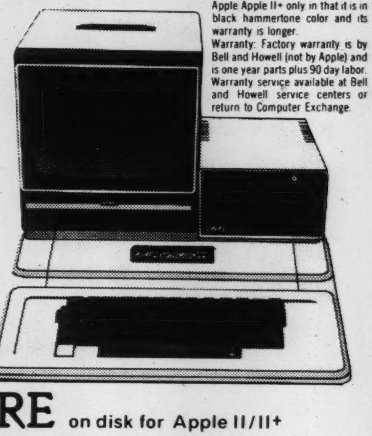
OUR REFERENCES: We have been a computer dealer since 1978 and in mail order since 1980. Banks: First Interstate Bank, (503) 776-5620 and Jefferson State Bank, (503) 773-5333. We belong to the Chamber of Commerce, (503) 772-6293, or call Dun & Bradstreet if you are a subscriber. Computer Exchange is a division of O'Tech Group, Inc.

Professionals

Manufactured Exclusively for **Bell & Howell** by **apple computer**

	LIST PRICE	OUR PRICE	SAVE
B&H Apple II+			
64K (48K + ALS 16K)	$1725	$1195	$530
DISK II w/3.3 Cont.	$645	$520	$125
DISK II Only	$525	$450	$75

OR: SAVE OVER $350 on a pair of drives.
Buy a pair of Micro-Sci A2 Drives.
See opposite page.



The B&H Apple II+ differs from the Apple Apple II+ only in that it is in black hammertone color and its warranty is longer.

Warranty: Factory warranty is by Bell and Howell (not by Apple) and is one year parts plus 90 day labor. Warranty service available at Bell and Howell service centers or return to Computer Exchange.

apple® II/II+ supply center

SPECIAL

B & H APPLE II+
64K STARTER SYSTEM **$1,795**
SAVE $ 765

- 48K B&H Apple II+
- ALS 16K RAM Card
- Disk II with 3.3 DOS & Controller
- Sanyo 9" Green Monitor

Save $832 total. Substitute a A2 Micro-Sci drive for the Disk II.
Add another A2 drive and save a total of $888.

μ-SCI MICRO-SCI FOR THE APPLE II/II+, III DIRECT SUBSTITUTES for APPLE DRIVES

Micro-Sci A2 drives and/or controllers are direct plug compatible substitutes for Apple drives and controllers.

	LIST PRICE	OUR PRICE
For Apple II		
A2, 5¼", 143K Disk Drive	$ 479	$369
Controller Card for A2 Drive	$ 100	$ 79
A40, 5¼", 160K Disk Drive	$ 449	$359
A70, 5¼", 286K Disk Drive	$ 599	$479
Controller for A40 or A70	$ 100	$ 79
Filer, Disk Utility Software	$ 20	$ 15
For Apple III NEW!		
A3, 5¼, 143K Drive	$ 449	$359
A73, 5¼, 286K Drive	$ 649	$529
A143, 5¼, 572K Drive	$ 799	$669

HARDWARE

for Apple II/II+

	LIST PRICE	OUR PRICE
MICRO-SCI, Disk Drives, Plug/software compatible to Apple. See Micro-Sci section.		
RAM CARDS:		
Microsoft, 16K RAM Card	$ 195	$149
★ **ALS**, 16K ADDRam	$ 149	$ 59
Saturn Systems, 32K	$ 249	$169
64K	$ 425	$319
128K	$ 599	$459
VC Expand 40 or 80	$ 125	$ 75
Axlon, 320K RAM Disk system	$1395	$995
80 COLUMN VIDEO CARDS:		
ALS, Smarterm	$ 345	$245
Videx, Videoterm	$ 345	$249
See more **ALS** and **Videx** below.		
Vista, Vision 80	$ 249	$229
M&R, Sup R term	$ 375	$319
MISCELLANEOUS:		
ALS, Smarterm 80 Col. Card Special	$ 345	$249
Z Card (Z-80) W/CPM Special	$ 269	$199
16K ADDRam Special	$ 149	$ 59
★ Synergizer Pack Special	$ 749	$450
Synergizer Pack includes above 3, + CP/M book.		
Note: Above is a limited time offer.		
Apple Computer,		
Silentype II Printer	$ 395	$335
Graphics Tablet	$ 795	$675
Joystick II	$ 50	$ 39
Game Paddle	$ 30	$ 19
Numeric Keypad	$ 150	$119
★ **Axlon**, 320K RAM Disk System	$1395	$995
CCS, Serial Interface 7710A	$ 150	$139
Other CCS Cards in stock	Call	Call
Dan Paymar, Lower Case Chips	$ 50	$ 39
Hayes, Micromodem II	$ 379	$289
Smartmodem	$ 279	$229
★ **Keyboard Company**,		
Joystick II	$ 50	$ 39
Game Paddle	$ 30	$ 19
Numeric Keypad	$ 150	$119
M&R, RF Modulator	$ 30	$ 25
Sup R fan	$ 50	$ 39
★ **Microsoft**, Z80 Softcard	$ 399	$269
16K RAM Card	$ 195	$149
Softcard Premium Pack	$ 775	$579
Mountain,		
CPS Multifunction Card	$ 239	$209
★ Clock/Calendar	$ 280	$245
Novation, Applecat Modem	$ 389	$329
Orange Micro, Grappler	$ 165	$119
★ **Practical Peripherals**, w/cable & Conn.)		
MBS 8K Serial (Epson)	$ 159	$129
MBP 16K Para (Epson)	$ 159	$129
★ Microbuffer II 16K, (printer ??)	$ 259	$209
Microbuffer II 32K, (printer ??)	$ 299	$229
RH Electronics, Super Fan II	$ 75	$ 59
SSM, A10 Serial/Para Interface	$ 195	$159
TG Products: Game Paddles	$ 40	$ 29
Joystick	$ 60	$ 45
Select-A-Port	$ 60	$ 45
★ **Videx**, Videoterm 80 col.	$ 345	$249
Soft Video Switch	$ 35	$ 25
Enchancer II	$ 149	$ 99
Enchancer (Rev 6 or 7 +)	$ 129	$ 99
Function Strip	$ 79	$ 59
Full Videx Line. Call, up to 35% off		

SOFTWARE on disk for Apple II/II+

OUR BEST SELLERS — CALL ON OTHERS

BUSINESS

	LIST PRICE	OUR PRICE
Apple Computer, Inc.		
The Controller (Accounting)	$ 625	$499
Apple Writer II	$ 150	$119
Apple Pascal	$ 250	$199
Apple Fortran	$ 200	$159
DOS Tool Kit	$ 75	$ 59
DOS 3.3 Upgrade Kit	$ 75	$ 59
Apple Pilot	$ 150	$119
DJ Portfolio Evaluator	$ 50	$ 45
How to!	$ 50	$ 39
Microcourier	$ 250	$199
Micro Telegram	$ 250	$199
Time Manager	$ 150	$119
Apple Logo	$ 175	$139
Applied Soft Tech., Versa Form	$ 389	$289
Artsci, Magic Window	$ 100	$ 75
Ashion-tate, dBase II (CP/M)	$ 700	$479
Beagle Bros., Utility City	$ 30	$ 22
DOSS Boss	$ 24	$ 18
Borderbund, G/L with A/P	$ 495	$369
A/R (call on avail.)	$ 495	$369
Payroll	$ 395	$295
Continental, GL, AR, AP or PR, ea.	$ 250	$189
1st Class Mail	$ 75	$ 59
Property Mngmt.	$ 495	$369
dBase II for Apple II/II+ CP/M	$ 700	$479
Fox & Geller,		
Quickcode for dBase II	$ 295	$259
Hayden, Pie Writer (Specify brd.)	$ 170	$115
High Tech., Store Mgr.	$ 250	$189
★ Job Control Sys.	$ 750	$350
Info Master	$ 189	$119
Howard Soft,		
Creative Financing	$ 195	$145
Real Estate Analyzer II	$ 195	$145
1982 Tax Preparer	$ 150	$115
Info. Unlim., Easywriter (PRO)	$ 175	$129
★ **Innovative**, Spellguard (CP/M)	$ 295	$150
Insoft, Accountant (CP/M)	—	$ 99
For each GL, A/R, A/P or Payroll		
★ **Micro Craft**,		
(CP/M) Professional Billkeeper	$ 750	$395
Legal Billing & Timekeeping	$ 750	$395
Micro Lab, Data Factory ver 5.0	$ 300	$249
Visifactory	$ 75	$ 56
Invoice Factory	$ 200	$129
Tax Manager	$ 150	$ 95
Micro Pro, (all CP/M)		
★ WordStar® + Training Manual	$ 375	$199
MailMerge™	$ 125	$ 69
SpellStar™	$ 200	$119
SPECIAL! All 3 above	$ 700	$350
Data Star™	$ 295	$169
CalcStar™	$ 195	$119
SuperSort™	$ 200	$119
SPECIAL! All 3 above	$ 690	$345
WordStar® Training Manual	—	$ 25
Muse, Super Text II	$ 150	$113
Super Text 40/80	$ 175	$129
Form Letter	$ 100	$ 75
On-Line, Expediter II+	$ 136	$ 75
ScreenWriter II	$ 130	$ 95
General Manager	$ 150	$115

	LIST PRICE	OUR PRICE
Osborne/C.P. Soft., (Disk and Book)		
★ Some Common Basic Programs. 75 Business, Statistics and Math programs for the Apple II	$ 100	$ 49
★ Practical Basic Programs. 40 more very valuable programs beyond "Some Com. Basic Prog"	$ 100	$ 49
Peachtree, GL, AR, AP, INV. or PR	$ 400	$189
★ Magic Wand (Specify board)	$ 500	$250
Perfect, Perfect Writer	$ 389	$239
Perfect Speller	$ 189	$119
Perfect Filer	$ 289	$179
Sensible, Sensible Speller	$ 125	$ 95
Silcon Valley, Word Handler	$ 250	$119
Sof/Sys, Executive Secretary	$ 250	$189
Executive Speller	$ 75	$ 55
Solldus/Softech		
★ Stockfile	$ 600	$350
Stockseller	$ 700	$450
Software Publishing,		
PFS II	$ 125	$ 95
Graph	$ 125	$ 95
Sorcim, SuperCalc, (CP/M)	$ 295	$219
Southeastern,		
Data Capture 4.0, specify brd.	$ 90	$ 69
Stoneware, DB Master	$ 229	$179
DB Utility I or II	$ 99	$ 75
VisiCorp/Personal Software,		
Visicalc 3.3	$ 250	$189
VisiDex Special!	$ 250	$175
VisiFile	$ 250	$199
Desktop Plan II or III Special!	$ 250	$175
Visiplot	$ 200	$159
VisiSchedule New!	$ 300	$239
VisiTrend & VisiPlot Special!	$ 300	$210
VisiTerm	$ 100	$ 79
Zork	$ 40	$ 33

UTILITY & DEVELOPMENT

	LIST PRICE	OUR PRICE
Beagle, Utility City	$ 30	$ 22
DOS Boss	$ 24	$ 18
Central Point Software:		
Filer, DOS Utility	$ 25	$ 18
★ Copy II Plus (bit copier)	$ 40	$ 35
Epson, Graphics Dump	$ 15	$ 9
Insoft,		
GraFORTH by Paul Lutus	$ 75	$ 59
ALD System II by Paul Lutus	$ 75	$ 59
TransFORTH II by Paul Lutus	$ 125	$ 99
Electric Duet by Paul Lutus	$ 30	$ 25
Microsoft,		
A.L.D.S.	$ 125	$ 75
BASIC Compiler	$ 395	$299
Cobol 80	$ 750	$559
Fortran 80	$ 195	$149
Olympic Decathlon	$ 30	$ 24
TASC Compiler	$ 175	$159
★ **Omega**, Locksmith (bit copier)	$ 100	$ 75
On-Line, Expediter II	$ 100	$ 75
LISA 2.5	$ 80	$ 60
Phoenix, Zoom Grafix	$ 40	$ 29
Southwestern, ASCII Express	$ 80	$ 59

OVERSTOCK SPECIAL FOR APPLE II/II+

VIDEX, Videoterm, 80 column	$ 345	$249
ALS 16K AddRAM Card	$ 149	$ 59
ALS ZCard, Z80 CP/M Card	$ 269	$199
ALS Smarterm 80 Col. Card	$ 345	$245
ALS Synergizer Pack	$ 749	$450

HOME & EDUCATION

Autom. Sim., Crush Crumb Chomp	$ 30	$ 23
Broderbund,		
Apple Panic	$ 30	$ 21
Arcade Machine (call first)	$ 45	$ 32
Star Blazer	$ 32	$ 24
Many others		Call
Budgeco, Raster Blaster	$ 29	$ 22
Cavalier, Bug Attack	$ 30	$ 23
Star Thief	$ 30	$ 23
Continental, Home Accountant	$ 75	$ 56
Home Money Minder	$ 35	$ 26
Edu-Ware	Call	Call
Hayden, Sargon II (Chess)	$ 35	$ 29
Infocom, Deadline	$ 50	$ 38
Zork I or II	$ 40	$ 29
Insoft, Electric Duet by Lutus	$ 30	$ 25
GraFORTH by Lutus	$ 75	$ 59
Lightning, Mastertype	$ 40	$ 29
Microsoft, Olympic Decathlon	$ 30	$ 24
Typing Tutor	$ 25	$ 19
Muse, Robot War	$ 40	$ 29
Castle Wolfenstein	$ 30	$ 23
On-Line, Pegasus II	$ 30	$ 22
Ultima II	$ 55	$ 27
Threshold	$ 40	$ 30
Cranston Manor	$ 35	$ 26
Mystery House	$ 25	$ 19
Softporn (X Rated)	$ 30	$ 22
Ulysses & Golden Fleece	$ 40	$ 22
Sentient, Oo-TOPOS	$ 33	$ 25
Sirius, Gorgon	$ 40	$ 29
Twerps	$ 30	$ 22
Sir-Tec, Wizardry	$ 50	$ 39
Sub Logic, Flight Simulator	$ 34	$ 28
Pinball	$ 30	$ 23
Strategic, Southern Command	$ 60	$ 30

OTHER BRANDS IN STOCK. CALL.

ATARI®

800 Computer 16K	$ 899	$665
800 Computer 48K	$1099	$777
400 Computer 16K Special!	$ 299	$225
810 Disk Drive	$ 600	$444
850 Interface	$ 220	$159
410 Recorder	$ 100	$ 79
16K RAM	$ 100	$ 85
32K RAM	$ 200	$109

Call for other software and accesories.

NEC

8001 32K Computer	$ 995	$739
286K Total, Dual Drive PC8031	$ 995	$739
32K addon and I/O Unit PC8012	$ 649	$485

Call for other software and accesories.

★ Means a BEST buy.

THE WORLD'S LARGEST COMPUTER MAIL ORDER FIRM

Computer Exchange

A Division of
O'TECH Group Inc.
Ad #939

ALL MAIL: P.O. Box 1380, Jacksonville, OR 97530
WAREHOUSE AND OFFICES BY APPOINTMENT AT 6791 UPPER APPLEGATE ROAD.
CIRCLE 145 ON READER SERVICE CARD

Our model is obviously incomplete, as was Malthus's version of it. For one thing, it fails to consider the effect on food production of having more labor to cultivate the land. Including this would involve a feedback loop of the sort that *Micro-Dynamo* is explicitly designed to handle.

Other Features

Nor can a simple program like this one illustrate the rest of the features of the language, which include pseudo random numbers distributed either uniformally or normally, sudden shocks to the system, regular cyclical behavior of one or more variables, delays, smoothing (averaging) of a variable and arbitrary relationships between two variables entered by using a table of numbers instead of an equation.

Mathematical operators available are the basic four (+,-,*,/), sin, cos, sqrt, the exponential e and natural logarithm. No operator is available for raising a value to a power; logs must be used instead. Although there is a maximum number of equations *Micro-Dynamo* can handle at once — strictly speaking, a limit on the number of mathematical operators — this number is not given in the instruction manual. The manual does, however, note that about 100 different variables are possible.

Logical operators are limited to greater than, less than, greater than or equal to, and less than or equal to. Because the programmer neither has nor needs control of the order in which the program lines will be run, there are no *gotos*, subroutines, or other branches.

Lastly, *Micro-Dynamo* cannot solve simultaneous equations. It must find a starting point and work sequentially along a time path. If it can't, it stops and prints out the error message SIMULTANEOUS ACTIVE EQUATIONS INVOLVING and then displays the offending equations.

Like all high-level languages, *Micro-Dynamo* has numerous ways to tell the programmer he has made a mistake — 55 of them, in fact, not one of which is "syntax error." Some are reasonably familiar: DIVIDE BY 0, MODEL IS NOT ON DISKETTE, SQRT OF NEGATIVE NUMBER. Others are very specific to the task of the language: BAD LEFT SIDE OF = (left hand side of an equation is incorrect); NOT USED (some variable you included in the program was never actually used in your model, indicating that an equation may have been left out); TOO FEW) also TOO MANY) (when parentheses don't match).

Because this is a compiled language, errors are caught during the compilation stage well before the program is run. When an error is found, the compiler stops, prints the error message and the line it is in, and puts the letter V above the line pointing at the character it thinks is in error. Even though the error may be serious enough to prevent the program from running, you are given an opportunity to quit or to finish compiling to search for more errors. Only after an error-free compilation will the program begin running.

Shortcomings

Unfortunately, as good as *Micro-Dynamo* is — and, unless some hidden bugs come out in time, it should find enthusiastic acceptance among model builders — it does have some drawbacks. Most of these shortcomings stem from the fact that it is a revision of a language that is now almost a quarter of a century old rather than a new package designed specifically to accommodate the abilities and limitations of microcomputers.

Although it has been shined up, its age does peek through. Variable names, for example, are limited to six characters as in Fortran IV, and statement lines can be a maximum of 80 columns long, which is the same number as on the cardboard IBM card that was the only input device available a couple of decades ago.

Even though an Apple monitor displays only 40 columns, statements longer than that continue past the end rather than wrapping around to the next line as in Basic. To see the remainder, you must press CONTROL-A to shift the screen light and left — a pain in the neck.

Although the screen display is an impressive hi-res color graph, printed graphs use characters — a number or letter — for each plot just as they did on the IBM 1401. (You remember that one . . . it was the Model-T of the industry.)

Although you can get a hi-res plot by hitting RESET, then booting DOS from a slave disk (not the system master, which zaps hi-res page one) and using a graphics package to do a screen dump to a printer, it is laborious and erases both *Micro-Dynamo* and your program from memory.

It is unfortunate that the author of the micro version of this language ignored the development of the dot matrix printer and its graphics capabilities in the interval since the mainframe and mini versions were written.

And, perhaps most serious, the *Micro-Dynamo* package itself makes no provision for listing your program so that you can proofread it easily. This didn't matter when you could have it all on a handful of cards that could be listed off-line by any reader/printer, but editing a 200-line program when you can see only 24 lines at a time on the screen is a nightmare, especially when it has no line numbers.

Because the program is saved on the disk as a separate file, Pascal can list it, but the *Micro-Dynamo* instructions don't explain how.

Dynamo, Pascal, and the User

For our *Micro-Dynamo* review, we decided to find a reviewer who was familiar with systems modeling but not with Apple Pascal, the computer environment under which it runs. We felt that this strategy would ensure the best possible "simulation" of a typical *Micro-Dynamo* user.

A few capabilities of the Pascal system that we forgot to tell our reviewer about would have made his job even easier. First, it is possible to print charts on paper exactly as they appear on the screen if you purchase a separate graphic dump program that is compatible with Pascal. Second, most 80-column boards can be used with the system for a fuller display of your model as you work on it.

On the other hand the Pascal system, and the reliance of *Micro-Dynamo* on it can be blamed for some of Mr. Light's problems. The saving and printing of work files, including models, has seldom been adequately explained in print. The authors of *Micro-Dynamo* could have overcome the unfriendliness of Apple Pascal only through great effort. The Pascal system was designed for programmers and many non-programmers find it somewhat confusing. — *MC*

A Bug?

Finally, either the package has a bug or the instruction manual is not entirely clear (and most of the time it is so precise and lucid that it could serve as a model instruction manual for the industry — which is sorely in need of one).

When you wish to leave the editor and run the program you have written, you type Q for quit and then are shown an exit menu. The author of the manual suggests always selecting W to write the program on a disk. This is fine until you return to the editor from the compiler to correct your errors. When you have finished, pressing W writes the old program back on the disk rather than the corrected one.

Saving the corrected program is laborious. You must type Q for quit, U for update, R to return to the editor, Q to quit again, W to write the updated program to the disk, the name of your program using DYN2: as a prefix instead of the more familiar suffix D2 if you want it sent to drive two and finally E to exit the editor.

Knowledge of the Pascal operating system is not strictly necessary to get *Micro-Dynamo* up and running. Nevertheless, you won't get the most out of it unless you insist that your dealer give you a ten-minute demonstration on the Pascal operating system before you leave his store.

Undoubtedly some of the out-of-date features have been retained to make it easy to convert programs written for mainframe and mini versions of Dynamo into *Micro-Dynamo*. Those familiar with the capabilities of microcomputers but new to dynamic model building may find them a nuisance, but nothing more serious than that.

All in all, it is an exciting package that should receive serious consideration by professional forecasters and model-builders and may even enter the homes of a few Apple owners who like to create doomsday scenarios for parlor games. ☐

CIRCLE 352 ON READER SERVICE CARD

A Textbook for Modelers

For those interested in systems modelling who need more information than the Micro-Dynamo manual can provide, Addison-Wesley has published a big, hardbound book called *Introduction To Computer Simulation: The Systems Dynamics Approach.*

Written by five people, the book starts with explanations of the basic ideas behind systems dynamics, such as cause and effect thinking, and feedback relationships. In the course of more than 550 pages, it presents an extremely broad view of the tricks and techniques of modelling.

The suggested price of the book is $21.95. The Reading, Massachusetts-based publishing company also plans an instructor's Manual. — *MC*

EXPAND
YOUR ATARI* 400*
TO 64K RAM!

NEW!!!
MOSAIC 64K RAM

SELECT

Now 64K RAM is available for your Atari 400 with all these Mosaic features: Complete compatibility with all Atari software and peripherals. 4 year guarantee, easy installation and complete instructions, and more.

The Mosaic 64K RAM SELECT is the most advanced bank select memory system available, with 4 banks of 4K RAM addressed above the 48K address limit. Made for the serious Atari owner. Call today for your nearest Mosaic dealer. 1-800-547-2807.

MOSAIC™

P.O. Box 748
Oregon City, Oregon 97045
503/655-9574

CIRCLE 226 ON READER SERVICE CARD

PROFIT!

SHORT TERM TRADER
used to invest in stocks for the past four years could have made you annual returns of 14% to 93%. Compounding these annual returns would have
TRIPLED YOUR DOLLARS
in four years.

NOT JUST ANOTHER "PORTFOLIO" PROGRAM
technical charting of price/volume averages enables your computer to make
BUY-SELL DECISIONS
on any stock.

MENU DRIVEN

GOOF PROOF ENTRY
on formatted screens

HANDLES STOCK SPLITS

COMMISSION COST
estimates for both full service and discount brokers

PROJECTS VALUE OF CALL OPTIONS

HI-RES GRAPHS
of market indicators and individual stocks.

RUNS on APPLE II PLUS®
with one drive.

Send for free brochure. 80 page manual and 2 disk program $54. Manual alone $8. Visa and MasterCard users include account number and expiration date.

® Registered trademark of Apple Corporation.

MICRO STATISTICS
DIVISION OF KCR INCORPORATED
100 N.TRAVIS, BOX 1263, SHERMAN, TX. 75090
214/868-1019

CIRCLE 222 ON READER SERVICE CARD

NEW Kits Now Available

NEWPORT "Pro-Sticks"
the Mercedes of Joysticks
'Creative Computing Magazine' Aug. 1982

Soft-Touch Controllers
for busy fingers and fast action

NEW Extension "Y" Adapters
with rapid fire action

Build your own custom video-game controls from our proven high quality arcade components.

Create your own control console right in your home. Send $3.00 for a brochure of creative and innovative ideas in custom video game joysticks and controllers. Includes easy to follow schematics and instructions for Atari, Apple, Pet Commodor, TSR-80, and other computers, and a complete kit and components price list.

INQUIRE ABOUT OUR CLUB DISCOUNTS

Please rush me ____ brochures at $3.00 each (includes First Class Mail and handling) and mail to:

Name ____________________

Address ____________________

City ____________ State ____ Zip ____

NEWPORT MACHINE DESIGN
P. O. Box 418, Bishop, CA 93514
(714) 873-5677

CIRCLE 232 ON READER SERVICE CARD

WHO ARE YOU THIS TIME?

Are you the seeker of lost treasures in an enchanted realm of magical beings? Perhaps you're an astronaut, thousands of light years from earth, searching the galaxy's rim for the fabulous treasures and advanced technologies of a long-dead civilization. Maybe you're the plunderer of ancient pyramids in a maddeningly dangerous land of crumbling ruins and trackless desert wastes.

Imagine.

You wish to soar to other worlds, to behold wonders never beheld by mortal eyes, to dream unrestrained to the furthest limits of your imagination.

Imagine now that you can.

The ADVENTURE SERIES by Scott Adams has been reviewed by **every** major microcomputing magazine, receiving only the highest praise for its mind-puzzling challenge & refreshing originality. Tens of thousands of adults and children have matched wits with the Adventure Master. Now, it's your turn. If you crave the challenge and panorama of the exotic, touched with sparkling humor, then the Adventure Series is for you.

With the incredible Adventure Series by Scott Adams,

YOU ARE WHOMEVER YOU WANT TO BE, WHENEVER YOU WANT TO BE!

	SINGLE TAPE	12 PACK TAPE	SINGLE DISK	TRIPLE DISK	12 PACK DISK
APPLE	$19.95 24K	$129.95† 24K	$29.95* 48K	$69.95* 48K	—
ATARI	$19.95 24K	$129.95† 24K	—	$39.95 40K	$129.95† 48K
CP/M (Z-80)	—	—	—	—	$129.95†
TRS-80 MOD 1&3	$19.95 16K	$129.95† 16K	—	$39.95 32K	$129.95† 32K
TRS-80 MOD 2	—	—	—	—	$129.95

Adventure Hint Book (All 12)	$ 7.95
Adventure Hint Sheet (Single)	1.00
Commodore VIC (Cartridge)	39.95
T.I. 99/4 (Tape or Disk) Requires Adventure Command Module	29.95

*Scott Adams' Graphic Adventure Series Apple Disks-Full Color Hi-Res Graphics.
†12 Adventure Hint Book Incl.

Adventure
INTERNATIONAL
1982 A DIVISION OF SCOTT ADAMS, INC.

BOX 3435, LONGWOOD FL 32750
(305) 862-6917 (QUESTIONS)
ORDER FROM YOUR FAVORITE DEALER
or CALL TOLL FREE (800) 327-7172
(ORDERS ONLY PLEASE A.I. #119)

CIRCLE 103 ON READER SERVICE CARD

Finally, A Compiler For Everyone

Harry McCracken

creative computing

SOFTWARE PROFILE

Name: ZBasic 2.2
Type: Basic compiler
Format: Tape or disk
Summary: Excellent Basic compiler
Price: $79.95 on tape
$89.95 on disk
Manufacturer:
Simutek
4897 E. Speedway
Tucson, AZ 85712

Many TRS-80 programmers wish to write programs which need a fast execution speed, such as business programs which do lots of sorting and game programs with animated graphics. Some of these programmers learn machine language, but more of them are either intimidated by the complexity of machine language programming or simply do not have the time to delve into learning a new language.

What these people need is a Basic compiler; that is, a program which converts Basic programs into machine language. There are several compilers available for the TRS-80, most of which are expensive, require lots of memory and disk storage, and are complicated and time consuming to use. What has been lacking until recently was a Basic compiler as flexible and simple to use as Level II Basic itself.

> **ZBasic supports quite a few commands and functions beyond those of Level II Basic.**

Enter Simutek's *ZBasic 2.2* by Andrew Gariepy. *ZBasic* is the one Basic compiler that offers the speed of machine language, without giving up the many virtues of Basic. It is cheap, as Basic compilers go, runs on a 16K tape or disk system, and is a joy to use.

Anyone with a fair knowledge of Basic can easily put *ZBasic* to good use. It is an interactive compiler; that means that the Basic program and its compiled machine language equivalent are both in memory at the same time, and that you can jump quickly and easily between them. That is the key to both the power and the ease of use of the compiler.

Both tape and disk versions of the package include numerous versions of the compiler; there are separate ones for 16K, 32K, and 48K systems, and versions with and without high-precision math and disk I/O. After you load the appropriate version into the computer, *ZBasic* offers you the option of changing the parameters which allow you to relocate the program, chain programs, and restrict string lengths.

After that, you proceed normally. Write your program and debug it to your heart's content as you would without *ZBasic*; you only need compile your program when you want to execute the machine language version.

Of course, since *ZBasic*, your Basic program, and the compiled program must all be in memory at once, space for your program is limited; about 15K in a 48K disk system, for instance. However, by relocating or chaining programs, you can make programs as big as or bigger than you can under ordinary Basic.

Compiling The Program

Compiling your Basic program is very simple: just hold down the Z, X, and C keys at once, and, if your program has no errors, *ZBasic* will compile it and give you a menu allowing you to run your compiled program, save it, or return to Basic.

If *ZBasic* finds an error in your program, it tells you what and where it is and

---

Harry McCracken, 47 Carleton Street, Newton, MA 02158.

ZBasic 2.2, continued...

returns to Basic so you can fix it. *ZBasic* can't find logic errors in the flow of your program; it just detects syntax errors, and other errors which prevent it from compiling your program properly.

While *ZBasic* can compile most Basic commands and functions, there are a few useful ones it cannot handle. Programs with ON ERROR GOTO statements, for example, must be adapted before they can be compiled. While *ZBasic* lacks several scientific functions such as SIN and TAN, an appendix in the manual shows how to get some of them by calling the TRS-80 ROM.

Some Basic commands work slightly differently in *ZBasic*. INPUT, for instance, does not print a question mark automatically. *ZBasic* is also more picky about syntax than ordinary Basic. All arrays must be DIMed, and complicated string formulas may have to be broken down.

The biggest difference between *ZBasic* and Basic is the way *ZBasic* handles non-integer math. The documentation calls the *ZBasic* system @Math, because you must put an @ before all non-integer math statements. Stranger than that, though, is the requirement that non-integer numbers be in strings. That means that the Basic statement A=B*.25 becomes @A$=B$* ".25" in *ZBasic*. That sounds very odd, but it is easy to get used to. The main problem is that it makes converting programs which use high-precision math into proper *ZBasic* syntax a time consuming task.

ZBasic supports quite a few commands and functions beyond those of Level II Basic. Most of these are equivalents of Z-80 instructions, such as LDIR, and LDDR, which make it possible to split-scroll the screen. One of the nicest new commands is a tone generator, which makes it simple to add sound to any program.

While programs compiled by *ZBasic* are generally not as fast as equivalent code written in assembly language, they are almost always at least ten times faster than their Basic versions. Programs which do not make extensive use of non-integer math and string functions improve their running times even more significantly. In ordinary Basic, SET and RESET graphics are so slow that they aren't often useful. *ZBasic* makes them run so fast that they become a real alternative to character string graphics. Even the fastest sorting methods seem to creep in Level II Basic; *ZBasic* makes them zip.

I like ZBasic so much that I simply load it in before doing any Basic programming.

CMDFILE

The disk version of *ZBasic* includes a utility which is a valuable tool in its own right. CMDFILE, as it is called, is a versatile program which lets you load in machine language files from tape and disk, relocate them, and save them back to tape or disk. This not only allows you to save *ZBasic* programs on disk to tape, but also lets you save any non-protected machine language tape to disk, and vice versa.

On the whole, the documentation is quite good. The bulk of the manual is made up of an alphabetical list of *ZBasic* commands and functions, what they do, and any differences between the way *ZBasic* and ordinary Basic handle them. The section of the manual which describes relocating and chaining programs is especially good; it makes fairly complicated procedures easy to understand.

Another useful chapter is the one which explains how to convert programs so that they satisfy *ZBasic*. The manual also includes several useful subroutines and programs, such as a sorting routine and a primitive pong game.

The documentation for CMDFILE, although well written, is far more technical than the rest of the manual; if you don't understand hexadecimal, you really won't be able to make much use of CMDFILE. One other annoying although nonfatal problem with my copy of the manual is that several pages are in the wrong places. I don't know if that is the case with all copies of the manual or just mine.

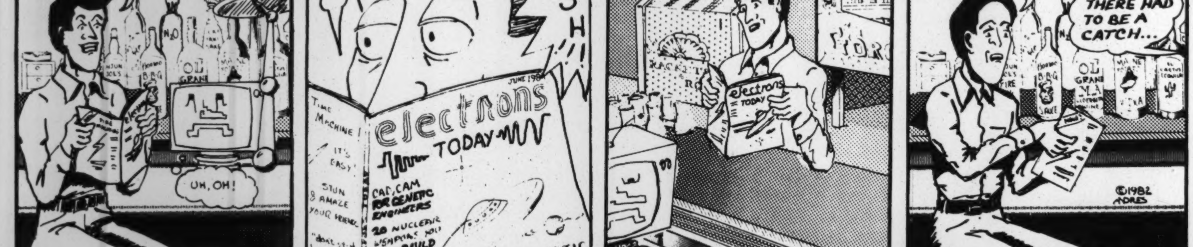
Anyone who is writing a program in Basic with hopes of selling it to one of the software publishers should think very seriously about compiling it with *ZBasic* before submitting it. The publishers of some other compilers require that you pay them a percentage of any royalties you earn from programs compiled with their compiler. All Simutek requires is a credit line and copyright notice at the start of the program and in the documentation. That is a small request indeed, considering that *ZBasic* can increase the sales potential of a Basic program dramatically.

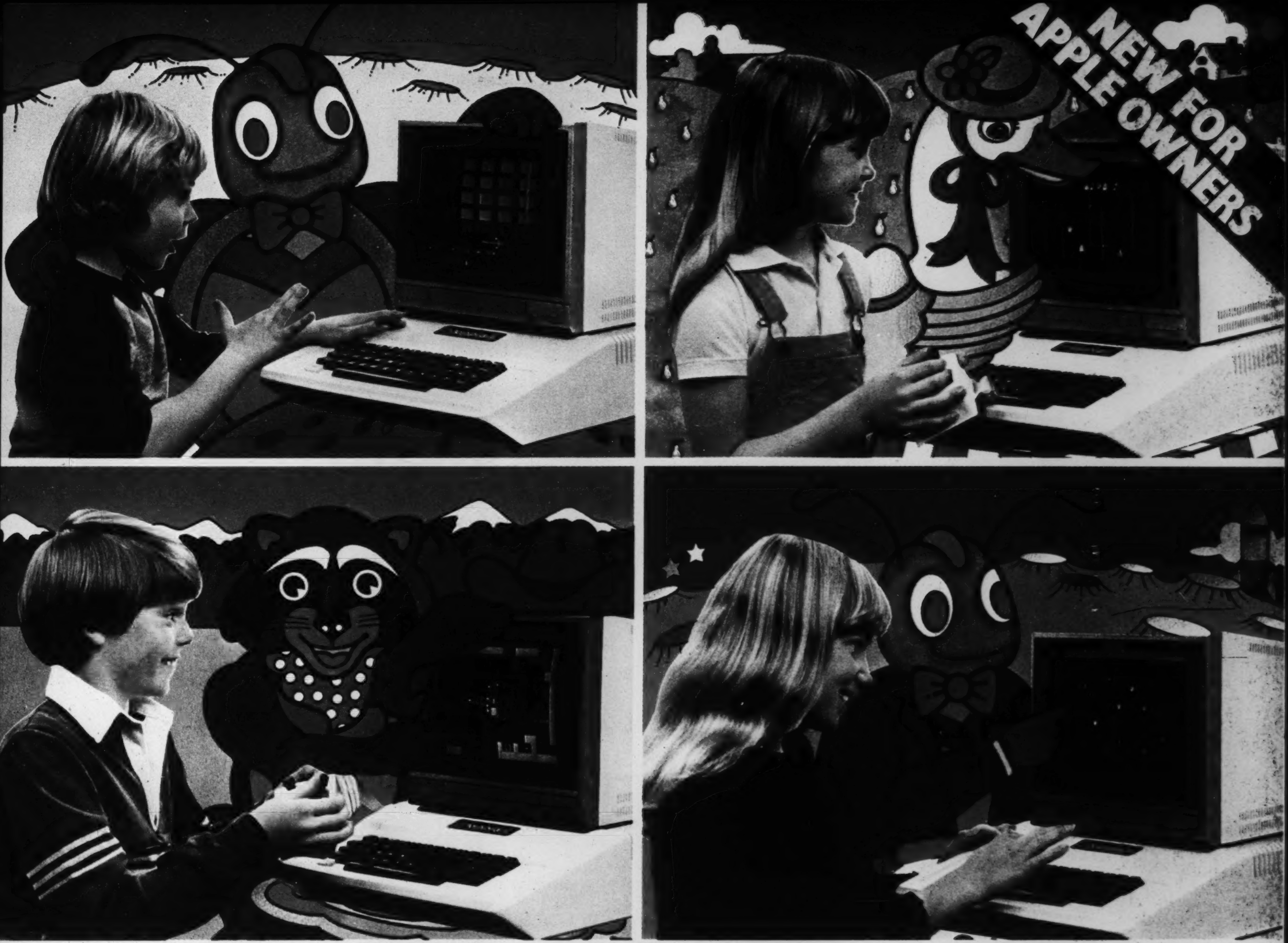
If you are a Basic programmer who is dissatisfied with the speed of Basic (I've never met one who wasn't) the price of a tape or disk copy of *ZBasic* is well justified by the speed and power you gain.

I like *ZBasic* so much that I simply load it in before doing any Basic programming; that makes it one of the few programs I use almost every day. To my mind, *ZBasic 2.2* is as big an improvement over Level II as Level II is over Level I. ☐

Bit Pit

Chas Andres


HEY, LOOK JAKE! AN "XX 84" FOR ONLY $99.95!
UH, OH!
FULL MAINFRAME CAPABILITY! COMPLETE SOFTWARE OPERATING SYSTEM!
CRASH!
JUNE 1984
electrons TODAY
TIME MACHINE! IT'S EASY!
STUN & AMAZE YOUR FRIENDS
"don't study history, change it!"
CAD, CAM FOR GENETIC ENGINEERS
20 NUCLEAR WEAPONS YOU CAN BUILD
BUILD THIS INTERGALACTIC FLYING SAUCER!
32-BIT CPU WITH 8 MEGA-BYTES IN A MICRO CABINET!
electrons TODAY
BUT IT'S ONLY GOT LAST MONTHS SOFTWARE...
I KNEW THERE HAD TO BE A CATCH...
©1982 ANDRES



NOW THE COMPUTER AGE IS THREE TO THIRTEEN.

BUMBLE GAMES

With Computer Learning Games™ from The Learning Company and an Apple computer, you can give your kids one of life's greatest gifts — the love of learning.

As the company that makes learning playful, we can help you give your kids a head start on life.

Younger kids will learn direction concepts like "above or below" and "left or right." Older kids acquire logic skills while creating patterns with colors and shapes. They'll also learn computer-age skills like number plotting and computer chip circuit design.

All learned from creative games using imaginary characters and lively themes. From Juggles' Rainbow to Gertrude's Puzzles, there are six packages in all.

So if you've got kids aged three to thirteen, take them to your local Apple dealer and try our learning games.

Then you'll see how exciting learning really can be.

Please send me a copy of your computer learning games catalog.

NAME____________________

ADDRESS____________________

CITY____________________

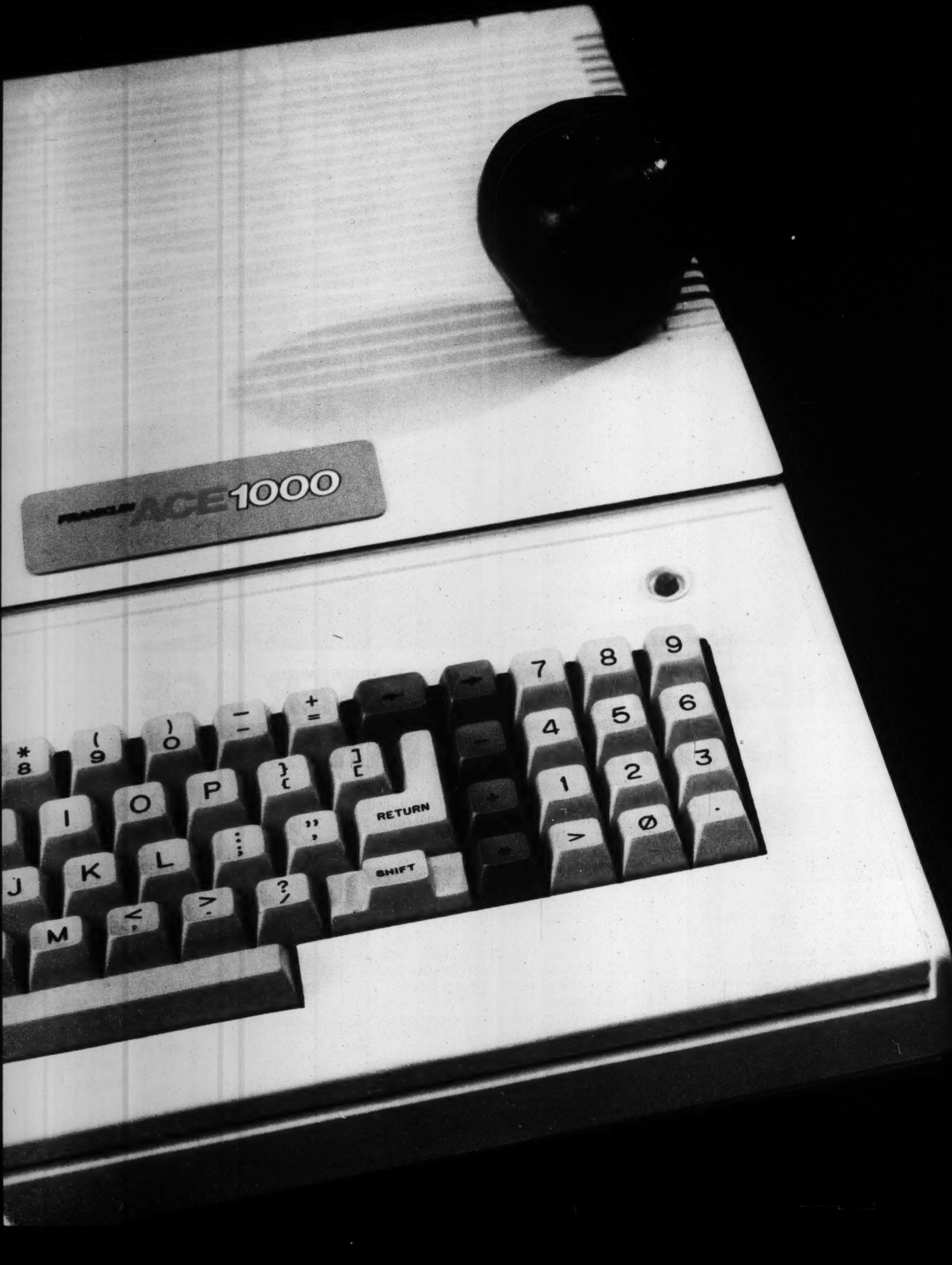
STATE__________ ZIP__________

The Learning Company
4370 Alpine Road, Dept. 103
Portola Valley, CA 94025
(415) 851-3160

THE LEARNING CO.
COMPUTER LEARNING GAMES

CIRCLE 201 ON READER SERVICE CARD

Apple is a registered trademark of Apple Computer, Inc. Bumble Games, Bumble Plot, Juggles' Rainbow, Gertrude's Puzzles, Gertrude's Secrets, Rocky's Boots, Logic Gators and Computer Learning Games™ are trademarks of The Learning Company.


FRANKLIN ACE1000

THE BEST DEAL IN TOWN!

THE FRANKLIN ACE 1000

You just can't beat an ACE. Especially the Franklin ACE 1000. It's the professional personal computer with all the trump cards —it costs less, it includes 64K of RAM, upper and lower case, a numeric pad and VisiCalc® keys, all features not found on the Apple® II.

Peripherals that work with the Apple II will work with the Franklin ACE 1000. Programs that run on the Apple will run on the ACE. Totally Apple compatible . . . yet, so much more!

The Franklin Ace 1000—price, power, quality, reliability—the best deal in town. Call or write today for the name of your local authorized Franklin dealer.

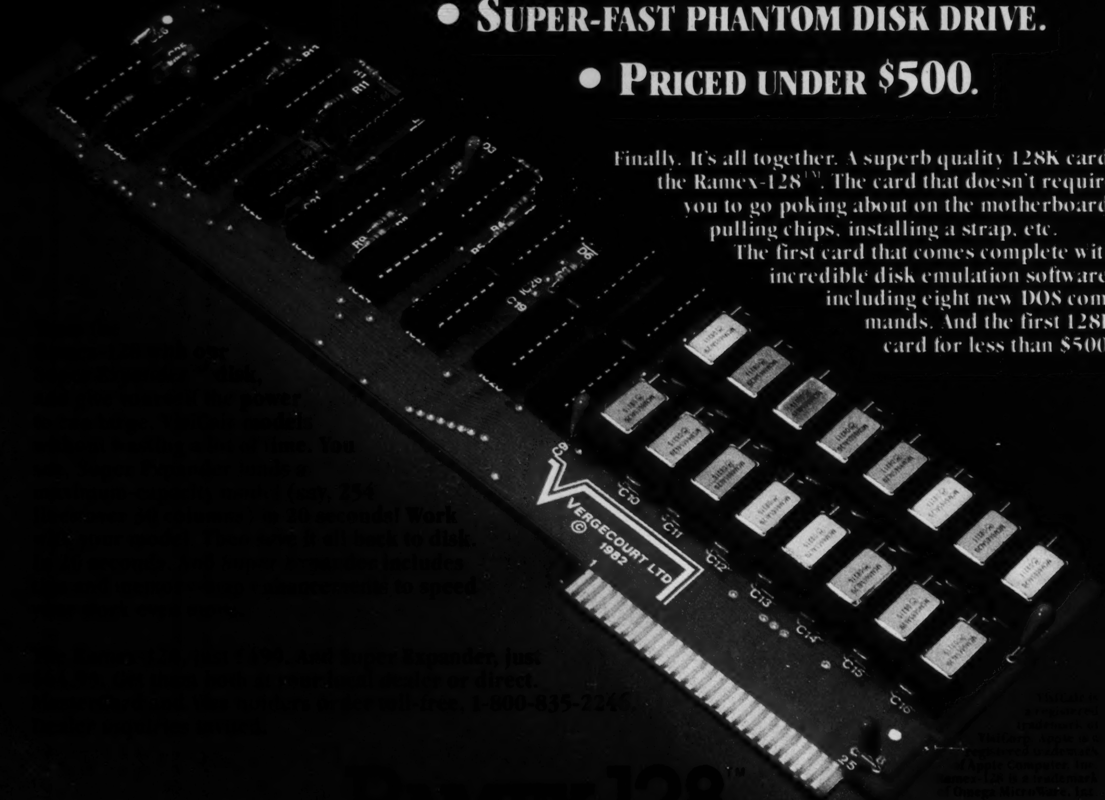
FRANKLIN
COMPUTER CORPORATION
7030 Colonial Highway
Pennsauken, NJ 08109
609-488-1700

Franklin ACE is a trademark of Franklin Computer Corporation
Apple is a registered trademark of Apple Computer Inc.
VisiCalc is a registered trademark of Visi Corp.

CIRCLE 174 ON READER SERVICE CARD

NOW HERE FOR YOUR APPLE®:
A CARD THAT BLOWS ALL THE OTHERS AWAY!

- LOADS OR SAVES A FULL VISICALC® MODEL IN 20 SECONDS. (NOT 16 MINUTES LIKE THE OTHERS)
- 136K FOR A VISICALC MODEL.
- SUPER-FAST PHANTOM DISK DRIVE.
- PRICED UNDER $500.



Finally. It's all together. A superb quality 128K card, the Ramex-128™. The card that doesn't require you to go poking about on the motherboard, pulling chips, installing a strap, etc. The first card that comes complete with incredible disk emulation software, including eight new DOS commands. And the first 128K card for less than $500.

[illegible] disk, [illegible] power [illegible] models [illegible] time. You [illegible] (say, 256 [illegible] 20 seconds! Work [illegible] save it all back to disk. [illegible] includes [illegible] to speed [illegible]

[illegible] And Super Expander, just [illegible] dealer or direct. [illegible] orders toll-free, 1-800-835-2246.

VisiCalc is a registered trademark of VisiCorp. Apple is a registered trademark of Apple Computer, Inc. Ramex-128 is a trademark of Omega MicroWare, Inc.

RAMEX-128™

UNDER $500. WHAT ARE YOU WAITING FOR?

OMEGA MICROWARE, INC.

[illegible] SO. RIVERSIDE PLAZA • CHICAGO, IL 60606 • 312-648-4844
CIRCLE [illegible] ON READER SERVICE CARD

MMSFORTH

Forth For The TRS-80

Anthony T. Scarpelli

If you are interested in one of the most powerful computer languages ever invented, then you will be interested in this review of Forth.

Forth was created in 1969 by Charles H. Moore at the National Radio Astronomy Observatory in Charlottesville, VA. It has grown into a language that not only controls the radio telescopes of that observatory, but is used at other observatories around the country. It is also one of the better application languages around because of the ease and speed with which programs can be written in it.

When I became interested in Forth, I didn't want to spend a great deal of money just to try it out, so I invested in the public domain assembly language source code of the language which is offered by the Forth Interest Group for less than $20. That version is meant to be implemented on an 8080 microprocessor based machine, and is not easily converted to a Z80 based microcomputer.

By far the easiest way to try Forth is to purchase a version designed to run on a Z80 computer.

The version I now have is MMSForth, which costs $129.95 for the disk-based version 2.0 from Miller Microcomputer Services.

Getting Started

The first thing you notice when you open the package is the loose-leaf, three-ring binder containing 135 pages of information on Forth: how to get it running, how to program with it, and some examples of simple programs. When you send in your license agreement, you receive another 67 pages which contain a memory map, the Forth glossary, 8080 assembler tables, and several other tables and lists.

It takes several hours to read through the manual, but to get started you need read only the preface and the first appendix.

The first appendix tells how to boot the system disk. What appears after the boot is the copyright information, your serial number, a copyright message, and the address of MMS. A few seconds later the directory listing the options you have available appears. You need not choose any of them, though, the boot loads the Forth language and is ready to go.

This directory is called the Utilities menu, and allows you to choose from the following:

FORMAT allows you to format a diskette.

BACKUP allows you to back up the system or any Forth diskette.

COPIES allows you to copy a range of blocks (a block is 1024 bytes of information).

SEARCH allows you to search for occurrences of words.

TRANSLATE allows you to translate from the older version 1.9 to the present version.

ALLCAPS allows you to change lowercase letters in some of the blocks to uppercase if your system doesn't support uppercase.

CUSTOMIZE allows you to configure the system for your own TRS-80.

EXTENSIONS displays the system options available.

PROGRAMS displays the programs that are available on the other diskette.

The extensions include: DBL-PREC (double-precision numbers), ARRAYS (one and two dimensions), STRINGS (similar to Level II strings), RANDOM (a random number generator), GRAPHICS (the TRS-80 graphics), SCREEN-PRINT (prints the screen to your printer including graphics characters), CASSETTE (tape routines), CLOCK (time and date routines), and TOOLKIT (various other handy routines).

The power of Forth comes from its ability to create new words, and to create words that define other words. When you use a word, Forth executes it as long as it is in the dictionary, and as long as any parameters the word may need precede it.

This version of Forth includes about 200 words with which you can create more words. One of the ways to create a word is with a colon definition. For example, if I write:

```
: TEST word word word etc. ;
```

I have defined a word called TEST using several previously defined words. The colon precedes the new word, and the semicolon ends the definition. This process continues until an entire routine or even a program can be called by just one word.

All of the utilities, extensions, and programs in MMSForth are words that have been previously defined, words that are made up of the core words, and core words that eventually become machine language routines.

Features

Let us now consider some of the features that make this version of Forth a very good buy and a very handy development system.

MMSForth will run on a 16K machine with only one disk drive. With 32K or more, however, there is more room for words and programs. Backing up a diskette can be done on just one drive, so a

---

Anthony T. Scarpelli, 98 Foxcroft Dr., Scarborough, ME 04074.

minimum system is all that is needed to use the language. It will also support multiple drive systems, and a version for the Model III is available.

One of the nice things about MMS-Forth is that many of the features of Level II Basic have been incorporated as extensions. Strings and graphics use similar words, and are used much like their Basic counterparts. The difference is that the execution speed of Forth is nearly as fast as assembly language, so graphics and string manipulation are much faster.

Another feature is that the screen-print routine will print the TRS-80 graphics if your printer is capable of handling them. The printer driver can be the regular ROM routine or a custom driver that can be changed to fit your system. An extended driver is available with page-formatting features.

creative computing
SOFTWARE PROFILE

Name: MMSForth
Type: Language and programming environment
System: TRS-80 Model I, III 16K, IBM PC 32K
Format: Disk
Language: Machine
Summary: Good value
Price: TRS-80 version $129.95, IBM version $249.95
Manufacturer:
Miller Microcomputer Services
61 Lake Shore Rd.
Natick, MA 01760

Programs

Some of the programs included on the second disk show Forth at its best. The SORT program demonstrates differences in speeds between different types of sorts. To show, for example, how slow an insertion sort is, this program loads the screen with a group of random characters, then sorts them. It does the same for the selection and Shell sorts, the quicksort, and a quicksort with assembly partition. It is fun to watch, and a good way to show off your system.

The game of Life is an old favorite. Programmed in Basic, the game takes a long time to go through a generation, but this Forth version is nearly as fast as an assembly language program.

One of the handy things you can do with Forth is to put assembly language mnemonics right into the definitions. Or you can create "code" words of just assembly language mnemonics. This version of Forth contains an 8080 assembler. When the loops of Life are converted to assembly language routines, the speed of a generation is extremely fast—much less than a second.

To start you off, a few patterns are available to initialize the Life generations. With the doodle routine, you can draw your own patterns.

Another game on the disk, BREAKFORTH, demonstrates how a high level language can be used to write a fast action, real-time version of a popular game.

CHECKBOOK is an example of a business program written in Forth. The source code for the program is provided and explained word by word.

Using some of the standard Forth editor commands, and some of its own, NOTEPAD allows you to write one page of text.

The Editor

The standard screen editor provided with the system is one of the best I have used. By using the CLEAR key, and the SHIFT and CLEAR keys together, you can delete, insert, and move characters, lines and whole screens of information. The arrow keys move the cursor around the screen with ease.

Forth is written in blocks of 1024 characters which comprise one screen of information (64 characters by 16 lines). Writing Forth programs involves the editing of these screens. Once a block is edited, it is saved in one of the two block buffers so another block can be edited. When a third block is called up, the first block is automatically saved on disk. When you finish writing the program, the word FLUSH saves the remaining blocks to disk.

Documentation

I am a firm believer in good documentation which provides as much information about a program as possible. MMS-Forth does a pretty good job of it, but doesn't go all the way. If you were to buy a Basic interpreter, you can be quite sure you wouldn't get the source code for it. With MMSForth you receive the source code for the entire system disk except for the first 13 blocks. You must list it yourself, but it is there. You also get the source code for the program disk.

The first 13 blocks contain the core words and assembly language routines as well as the disk I/O. The blocks which are provided allow you to see high level Forth programming, and when you become good at Forth, you can modify the code to improve upon or customize it for your own purposes. A total of 128 blocks of source code is a great deal to understand and change, but at least it is there, and I commend MMS for providing it.

If you have heard anything about standardization, it is probably that everyone would like it, but little is being done about it. There are currently four languages that have been standardized. but Forth is not yet one of them. However, thanks to a great deal of effort on the part of people who want to see Forth standardized, the Forth-79 Standard has come into existence.

MMSForth 2.0 contains the words published in this standard. This means that source code created on the TRS-80 can be transported to any other Forth machine and vice versa. That is the theory, anyway. I commend MMS for going along with the standard, and hope that in the future we TRS-80 owners will be able to talk to an Apple or IBM owner as easily as to another TRS-80 owner.

I have read everything available on Forth, and I can say that, except for one book, learning Forth from the available information is like learning Chinese from a dictionary. I thank MMS for providing a great deal of information on Forth, but Forth is an entire language, and you cannot learn it simply by reading the documentation normally provided with the system. You must go to other sources, and you must sit at the keyboard and work with the language.

Forth was not an easy language for me to learn. All of the manuals I have read started out with the easy things, but had a tendency to stop. The more difficult concepts, the use of assembly language, the extensibility of Forth, the best way to program in Forth, and good programming techniques, just were not there. I had to struggle with words that were defined, words that were not clearly explained, and words that were not explained at all.

MMS provides you with enough to start out, but you must purchase and study some of the other books and manuals available before you will become good at Forth. Luckily, one of the best books, *Starting Forth* by Leo Brodie (Prentice-Hall, 1981), is also sold by MMS. I recommend purchasing this book along with this program.

Although I have been very pleased with MMSForth, I have two real complaints about it. The first is that looking up unfamiliar information is very difficult. There is a table of contents, but it is too broad to be of much help.

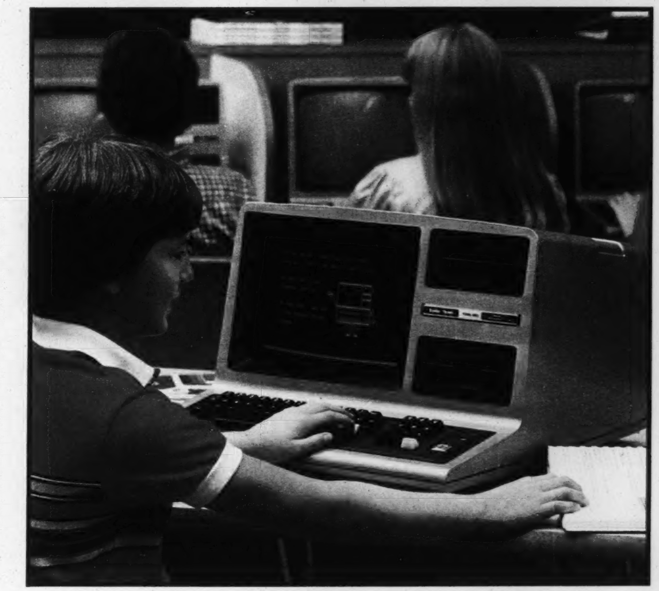
My second complaint is that occasionally some aspect of what I wanted to know was not explained in sufficient detail for a beginner. An index would be very handy, and I understand that one is being compiled. So there is hope. Whenever I ran into a real problem, a quick call to Miller Microcomputing got me an answer to it.

Summary

My overall recommendation is to buy this program if you want to try Forth. It is definitely a good value. ☐

CIRCLE 349 ON READER SERVICE CARD

"The Philadelphia Story" in Reading: Improved Skill and Comprehension At a Price Any District Can Afford



Now the Philadelphia School District's Computer Assisted Reading Development Program (C.A.R.D.) Can Be Included in Your School's Curriculum as Part of a New Series from Radio Shack.

Courseware Breakthrough

For the past fourteen years, the Philadelphia City Schools have been using a Computer Assisted Reading Development program throughout the district. It has undergone constant revision and testing so that it can be described as a model of computer-assisted learning. Now, Radio Shack has adapted this program for our TRS-80 Model III microcomputers, making it available to your district for the first time.

With C.A.R.D. I, your students can take advantage of a proven program that requires a minimum of teacher supervision. Using clearly developed lessons designed to hold their interest, they can improve reading comprehension.

Skill Development

C.A.R.D I: Sentences, the first of our Philadelphia-based courseware packages, is broken down into four topics, each of which builds a skill area in sentence use. The first topic, Sentence Recognition, asks students to identify which groups of words are sentences, while Labeling offers them a selection of possible labels to express the relationship between keywords. Sentence Relationships asks them to identify sentences with a related meaning, while Ordering Sentences has them put a series of sentences in logical order.

Each topic has a pretest, six or seven developmental lessons and a post-test. If the student passes the first pretest, he or she goes immediately to the pretest for the next topic. Otherwise, the student works through the lesson sequence, before tackling the post-test and going on to the next topic.

Reinforcement and Branching

One of the significant learning aspects of the C.A.R.D. program is that the computer provides immediate constructive feedback to every student response in the form of congratulatory messages, reinforcement after correct answers, and hints or corrections after incorrect responses.

In addition, key questions within the lesson are used as criteria for branching students through different lesson paths. When a student answers one of these questions, the computer immediately evaluates the response and automatically sends that student along the appropriate lesson path.

Comprehensive . . . Yet Affordable

C.A.R.D. I: Sentences will soon be joined by Paragraphs, Directions and Comprehension to give your district the full range of reading programs. C.A.R.D. I is priced at only $199.00 and is ready to run on your disk-based Model III with just the addition of either our TRS-80 AUTHOR I, a complete computer lesson development program, or the TRS-80 AUTHOR I Lesson Presentation Package.

For more information, visit your nearest Radio Shack Computer Center, store or participating dealer—or contact your Radio Shack Educational Coordinator.

For the name of the full-time Educational Coordinator in your area, call Radio Shack's Education Division at 800-433-5682 toll-free. In Texas, call 800-772-8538.

Radio Shack®

The biggest name in little computers™

A DIVISION OF TANDY CORPORATION

Retail prices may vary at individual stores and dealers.

CIRCLE 258 ON READER SERVICE CARD

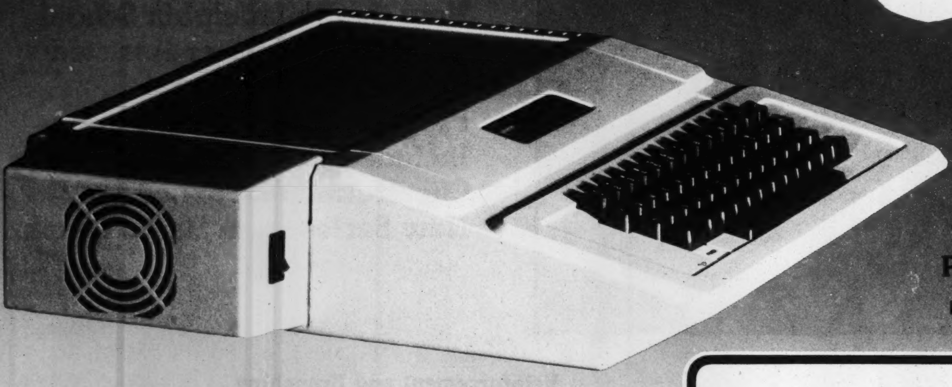
RH ELECTRONICS, INC.

COPYRIGHT © 1981 — PATENTS PENDING
566 Irelan, Buellton, CA 93427
(805) 688-2047
8:00 TO 5:00 CALIFORNIA TIME

COMPUTER PRODUCTS
DESIGNING • MANUFACTURING
ELECTRONIC ENGINEERING

SUPER FAN II™

FOR YOUR APPLE II* COMPUTER

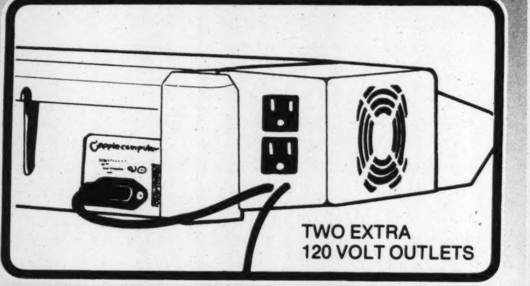


One Year Warranty

$74.95

With Zener Ray™ Protection $109.00

MASTERCARD — VISA



"COOL IT"

- ALSO FITS ON APPLE'S* NEW MONITOR STAND
- RED PILOT LIGHT ON/OFF SYSTEM SWITCH
- CLIPS ON — NO HOLES OR SCREWS • REPLACEABLE SWITCH
- AVAILABLE IN 120V or 240V AND 50/60 HZ • DURABLE MOTOR
- REDUCES HEAT CAUSED BY EXTRA PLUG-IN CARDS
- SOLD WORLD WIDE • UNIQUE 1 YEAR WARRANTY
- TAN OR BLACK COLOR • QUIETEST FAN ON THE MARKET
- INCREASED RELIABILITY — SAVES DOWN TIME AND REPAIR CHARGES
- LOW NOISE DUE TO DRAWING EFFECT OF AIR THROUGH YOUR COMPUTER AND SPECIAL FAN AND MOTOR DESIGN
- TWO EXTRA 120V OUTLETS FOR MONITOR AND ACCESSORIES TURN ON WHEN YOU TURN ON YOUR FAN (NOT AVAILABLE ON 240V MODEL)

SUPER FAN II™ WITH ZENER RAY OPTION $109.00

ZENER RAY™ TRANSIENT VOLTAGE SUPPRESSOR

OUR BUILT IN ADVANCED DESIGN UNIT GIVES
DRAMATIC COST SAVINGS — STOPS ANNOYING DOWN TIME
INSURANCE FROM VOLTAGE SPIKES - GLITCHES
DANGEROUS VOLTAGE SPIKES CAN JEOPARDIZE YOUR COMPUTER SYSTEMS
PROTECT COMPUTER - DISK DRIVE - PRINTER AND MONITOR

NO CUTTING WIRES • WON'T VOID WARRANTY, JUST PLUG IN SUPERFAN II WITH ZENER RAY

OTHER PRODUCTS BY **RH ELECTRONICS, INC.**

SUPER RAM II™ 16K RAM CARD FOR YOUR APPLE II. 2 YEAR WARRANTY $125

GUARDIAN ANGEL™ AN UNINTERRUPTABLE POWER SOURCE $595

12 VOLT TRANSVERTER 12 VOLT — RUNS YOUR APPLE II COMPUTER AND AND 5¼" DRIVE FROM YOUR CIGARETTE LIGHTER $149

*Registered trademarks of Apple Computer Inc.

DEALER INQUIRIES INVITED

CIRCLE 186 ON READER SERVICE CARD

Pascal For CP/M Systems

Roger Edelson

creative computing
SOFTWARE PROFILE

Name: JRT Pascal 2.1
Type: Language
System: CP/M
Format: 8 inch single density disk
Language: Machine
Summary: Tremendous value for the price
Price: $29.95
Manufacturer:
JRT Systems, Inc.
Box 22365
San Francisco, CA 94122

While the $29.95 price of JRT Pascal may be the first feature which attracts attention, the virtues of the compiler go far beyond this reasonable price. For starters, the floating-point operations are performed in 14-figure BCD format which allows calculations to range from 10^{-64} to 10^{+63} (a range of 128 magnitudes). Other CP/M Pascal compiler implementations offer only seven digit precision with a dynamic range of 10^{36}. With 14-digit precision, JRT Pascal is suitable for both business and scientific applications, and as the data are stored in BCD format there are no errors when converting from internal storage to print format.

The second most noticeable features of JRT Pascal are its ease of use and the reasonable size of the resident compiler. JRT Systems has solved the problem of fitting the compiler and CP/M operating into a 52K memory space with enough room left over to produce useful results.

One well known and highly respected Pascal compiler simply will not run under CP/M on my NorthStar Horizon which has only 56K of useable memory available below the Disk Boot PROM.

The JRT compiler occupies approximately 20K of memory and allows parts of the program to be compiled separately into "external modules." These external modules are then linked together at run-time under the EXECutive interpreter. For this reason, it is not necessary to run a huge compiler when linking various external procedures, and it is therefore possible to run large, useful programs.

The use of external procedures by JRT Pascal does not require any extra programming effort as the "virtual storage manager" handles everything automatically. To make use of externals even easier, they do not even have to be on the same, or logged-in disk; the EXEC program will search all available drives automatically. As initially configured, the EXEC interpreter will search drive A first, followed by drive B. A customization program is provided, however, which allows the user to define the search sequence as well as the drives to be searched.

Dynamic Memory Management

The EXEC program is loaded starting at the CP/M standard location of 100H and then loads the referenced Pascal program just above it. Both programs are fixed in size—the EXEC.COM file as defined in the release (about 20K) and the Pascal Program Module, by the size of the compiled .INT file.

The data stack (which contains all static variables, as created by the VAR declarations, and the parameters and procedure activation blocks) is variable in size and grows upward from the high end of the Pascal program.

Dynamic storage, which contains the I/O buffers, the dynamic variables, the file control blocks, and the external procedures, grows downward from the top of available storage. If there is limited available memory area, a collision between the data stack and the dynamic storage area is possible.

To avoid run time errors, the EXEC virtual storage manager attempts to maintain a minimum of 64-byte buffer between the two areas. If the memory space between the two variable areas falls below this value, the run-time system takes several different actions to restore this cushion. In the first stage, the least-recently-used external procedure is deleted, and then if necessary, the dynamic storage area is compressed.

The use of separately compiled external procedures coupled with the dynamic memory management system allows the size of the complete Pascal program to be practically unlimited. The external procedures are loaded into the dynamic storage area when first referenced by the main program, a procedure which is transparent to the user.

Unlike program chains or overlays, the external procedures remain in memory until an impending memory collision is detected. When this condition occurs, the EXEC program automatically unloads the least-recently-used external procedure, but to minimize the time required to

---

Roger Edelson, 3270 Granville Ave., Los Angeles, CA 90066.

reload the procedure when again required, the control blocks associated with the procedures are maintained. This procedure makes the actual storage capacity of the computer seem considerably larger than would be inferred from the actual memory size.

Another dynamic allocation feature available with JRT Pascal is dynamic strings. Similar to the string size dynamic structure found in MBasic, the string size is dynamically allocated. This means that strings do not have to be padded to fill the predefined size—a feature which makes string operation easy and virtually transparent.

Further, in JRT Pascal strings may be of any length up to 65K bytes, if required; the actual maximum size will be much smaller, as determined by available memory.

Debugging

JRT Pascal provides 75 specific English text error messages of between one and four lines, plus ten general run-time messages which are identified and defined in the manual.

To assist in debugging, significant additional information is provided when the EXEC program exits on an error. After the appropriate error message has been displayed, the current line number and last entered procedure name are provided in most cases.

A system status display containing useful information about the state of the run-time system at the time of error detection is created. The system status display presents nine fields of information indicating the address of the error, the current usage information for the address field. A typical system status display is presented in Figure 1, along with a simplified memory storage map.

JRT Pascal supports both sequential file processing and random file processing.

Also presented in the system status display is a count of the number of times storage has been auto-compressed (compr:), and a count of the number of external procedures which have been purged (purge:). The address given as prog: is the starting address of the main Pascal program; the HEX number at size: gives the program size, which when added to prog: gives base:—the bottom of the data stack.

The two values low: and tos: provide information detailing the amount of available memory which lies between these two dynamically allocated storage areas. It is this space (low:-tos:) which the dynamic storage allocator attempts to maintain at a value greater than 64 bytes.

JRT Pascal supports both sequential file processing and random file processing. Sequential file processing is usually faster than using random files because the disk operations can be organized sequentially, minimizing disk access.

JRT Pascal also allows improved disk use by allowing the user to define the size of the buffer which serves as a temporary storage area for data written to or read from the disk.

Often, it is not possible to prearrange the order in which data files will be required by the program; in these cases the slower random file processing must be used. In version 2.0 of JRT Pascal, random files were limited to 65K. Version 2.1 has removed this limit, allowing file sizes of 8Mb—the CP/M maximum.

JRT Pascal allows full random access to data by the Relative Byte Address (RBA) which gives the location of the data item within the file. This technique allows great flexibility, as the files may be of random length rather than forcing all files to be the size of the largest. A sample program illustrating random access to a file containing sales information is shown in Listing 1; the records are located by department number.

Figure 1. Sample system status display memory allocation.

```
System status display

   addr :54F5   prog :3BA7   size :4815
   base :83BC   cur  :89AC   tos  :8A33
   low  :A8B9   compr:0002   purge:0000

                 ------------------
                 I    CP/M        I
                 I----------------I
                 I  dynamic       I
                 I  storage       I
        low---> I----------------I
                 I                I
                 I  unused        I
                 I                I
        tos---> I----------------I
                 I                I
        cur---> I  data stack     I
                 I                I
        base--> I----------------I
                 I                I
                 I  Pascal code   I <--addr (of error)
                 I                I
        prog--> I----------------I
                 I                I
                 I  EXEC run-time I
                 I  system        I
        100h--> I----------------I
                 I  reserved area I
                 ------------------
```

Listing 1. Sample random file program.

```
PROGRAM INQUIRY;

LABEL 10;

TYPE
DEPT_RECORD = RECORD
        INVENTORY         : REAL;
        MTD_SALES         : REAL;
        YTD_SALES         : REAL;
        DISCOUNT          : REAL;
        END;

VAR
INPUT_AREA : DEPT_RECORD;
DEPT_FILE  : FILE OF DEPT_RECORD;
DEPT       : INTEGER;

BEGIN (* INQUIRY *)
OPEN( DEPT_FILE, 'C:DEPTDATA.RND', BINARY );

REPEAT
  WRITE('Enter dept number : ');
  READLN( DEPT );
  IF DEPT = 999 THEN GOTO 10;  (* EXIT *)
  READ( DEPT_FILE, RRN, DEPT;
        INPUT_AREA );
  WRITELN;
  WRITELN('dept',DEPT,
        '    inv',INPUT_AREA.INVENTORY:9:2,
        '    disc',INPUT_AREA.DISCOUNT:9:2);
  WRITELN('    MTD sales',MTD_SALES:9:2,
        '    YTD sales',YTD_SALES:9:2);
  WRITELN;
10: (* EXIT LABEL *)
UNTIL DEPT = 999;

CLOSE( DEPT_FILE );
END (* INQUIRY *).
```

Kelly's Computing

ATARI IBM SPECIALS

☐ 400 COMPUTER	399.00	Now	**299.00**
☐ 800 COMPUTER	899.00	Now	660.00
☐ 810 DISK DRIVE	599.00	Now	440.00
☐ 410 CASSETTE RECORDER	99.00	Now	87.50
☐ 850 INTERFACE MOD	219.00	Now	**180.00**
☐ PAC MAN (CART)	44.95	Now	**38.50**
☐ CENTIPEDE (CART)	44.95	Now	**38.50**
☐ CAVERNS OF MARS (DISK)	39.95	Now	**33.50**
☐ STAR RAIDERS (CART)	49.95	Now	**33.50**
☐ SPACE INVADERS (CART)	44.95	Now	**27.50**
☐ ASTEROIDS (CART)	44.95	Now	**27.50**
☐ MISSILE COMMAND (CART)	44.95	Now	**27.50**
☐ JOYSTICKS (PAIR) (ACCS)	21.95	Now	**19.50**
☐ PADDLES (PAIR) (ACCS)	21.95	Now	**19.50**
☐ GOLD EDITION 1-12 (DISK & CASS) (WHILE THEY LAST)	100.00	Now	**87.50**
☐ ADVENTURES 1-12 (CASS) ea.	19.95	Now	**16.50**
☐ LUNAR LANDER (CASS)	14.95	Now	**13.50**
☐ STAR FLITE (DISK)	19.95	Now	**16.50**
☐ REAR GUARD (DISK)	19.95	Now	**16.50**
☐ GALACTIC EMPIRE (CASS)	19.95	Now	**16.50**
☐ GALACTIC TRADER (CASS)	19.95	Now	**16.50**
☐ TREASURE QUEST (CASS)	19.95	Now	**16.50**
☐ GHOST HUNTER (DISK)	34.95	Now	**29.50**
☐ GHOST HUNTER (CASS)	29.95	Now	**25.50**
☐ PREPPIE (DISK)	29.95	Now	**25.50**
☐ PREPPIE (CASS)	24.95	Now	**19.50**
☐ TEMPLE OF APSHAI (DISK & CASS)	39.95	Now	**33.50**
☐ STAR WARRIOR (DISK & CASS)	39.95	Now	**33.50**
☐ RESCUE AT RIGEL (DISK & CASS)	29.95	Now	**25.50**
☐ DATESTONE OF RYN (DISK & CASS)	19.95	Now	**16.50**
☐ CRUSH, CRUMBLE & CHOMP (DISK)	29.95	Now	**25.50**
☐ INVASION ORION (DISK & CASS)	24.95	Now	**19.50**
☐ RICOCHET (DISK & CASS)	19.95	Now	**16.50**
☐ UPPER REACHES OF APSHAI	19.95	Now	**16.50**
☐ CURSE OF RA	19.95	Now	**16.50**
☐ CRYPTS OF TERROR (DISK)	34.95	Now	**29.50**
☐ CRYPTS OF TERROR (CASS)	29.95	Now	**25.50**
☐ EMPIRE OF THE OVERMIND (DISK)	35.00	Now	**29.50**
☐ TANKTICS (DISK)	29.00	Now	**25.50**
☐ TANKTICS (CASS)	24.00	Now	**19.50**
☐ CONTROLLER (DISK)	30.00	Now	**25.50**
☐ CRYPTS OF TERROR (CASS)	29.95	Now	**25.50**
☐ EMPIRE OF THE OVERMIND (DISK)	35.00	Now	**29.50**
☐ EMPIRE OF THE OVERMIND (CASS)	29.50	Now	**25.50**
☐ SHAMUS (DISK & CASS)	34.95	Now	**29.50**
☐ MASTER TYPE (CASS)	39.95	Now	**33.50**
☐ BASKETBALL (CART)	34.95	Now	**29.50**
☐ SUPER BREAKOUT (CART)	44.95	Now	**33.50**
☐ SCRAM (CASS)	24.95	Now	**19.50**
☐ TOUCH TYPING (CASS)	24.95	Now	**19.50**
☐ MAILING LIST (CASS)	24.95	Now	**19.50**
☐ MACRO ASSEMBLER & TEXT EDITOR	89.95	Now	**78.50**
☐ ASSEMBLER	59.95	Now	**50.50**
☐ FILE MANAGER 800 (DISK)	99.95	Now	**87.50**
☐ DISK MANAGER (DISK)	29.95	Now	**25.50**
☐ MICRO PAINTER (DISK)	34.95	Now	**29.50**
☐ GRAPHIS MASTER (DISK)	39.95	Now	**33.50**
☐ SAMMY THE SEA SERPENT (DISK & CASS)	24.95	Now	**19.50**
☐ PAGE 6 (DISK)	29.95	Now	**25.50**
☐ DISK DETECTIVE (DISK)	29.95	Now	**25.50**
☐ PATH FINDER (DISK)	34.95	Now	**29.50**
☐ SPEED READ PLUS (DISK)	59.95	Now	**50.50**
☐ SPACE EGGS (DISK)	29.95	Now	**25.50**
☐ GALAXY (DISK)	25.00	Now	**19.50**
☐ B-1 NUCLEAR BOMBER (CASS)	16.00	Now	**13.50**
☐ MIDWAY CAMPAIGN (CASS)	16.00	Now	**13.50**
☐ NORTH ATLANTIC CONVOY RAIDER (CASS)	16.00	Now	**13.50**
☐ NUKEWAR (CASS)	16.00	Now	**13.50**
☐ CONFLICT 2500 (CASS)	16.00	Now	**13.50**
☐ PLANET MINERS (CASS)	16.00	Now	**13.50**
☐ LORDS OF KARMA (CASS)	20.00	Now	**16.50**
☐ APPLE PANIC (DISK)	29.95	Now	**25.50**
☐ RASTER BLASTER (DISK)	29.95	Now	**25.50**
☐ BUG ATTACK (DISK)	29.95	Now	**25.50**
☐ TUMBLE BUGS (DUNG BEETLES) (DISK)	29.95	Now	**25.50**
☐ CANYON CLIMBER (DISK & CASS)	29.95	Now	**25.50**
☐ LE STICK (ACCS)	39.95	Now	**33.50**
☐ PACIFIC COAST HIGHWAY (DISK & CASS)	29.95	Now	**25.50**
☐ INTRUDER (DISK)	34.95	Now	**29.50**
☐ INTRUDER (CASS)	29.95	Now	**25.50**
☐ SHOOTING ARCADE (DISK & CASS)	29.95	Now	**25.50**
☐ TRACK ATTACK (DISK)	29.95	Now	**25.50**
☐ CLOWNS & BALLOONS (DISK & CASS)	29.95	Now	**25.50**
☐ MEGALEGS (DISK & CASS) (WHILE THEY LAST)	34.95	Now	**29.50**
☐ COMPU-READ (DISK)	29.95	Now	**25.50**
☐ COMPU-MATH/FRACTIONS (DISK)	39.95	Now	**33.50**
☐ COMPU-MATH/DECIMALS (DISK)	39.95	Now	**33.50**
☐ COMPU-MATH/FRACTIONS (CASS)	29.95	Now	**25.50**
☐ COMPU-MATH/DECIMALS (CASS)	29.95	Now	**25.50**
☐ MATCH RACERS (DISK)	29.95	Now	**25.50**
☐ PATHFINDER (AVAIL. FALL) (DISK)	34.95	Now	**29.50**
☐ DEADLINE (DISK)	49.95	Now	**42.50**
☐ ZORK I (DISK)	39.95	Now	**33.50**
☐ ZORK II (DISK)	39.95	Now	**33.50**
☐ POOL 400 (CART)	39.95	Now	**33.50**
☐ ACTION QUEST (DISK & CASS)	29.95	Now	**25.50**
☐ K-RAZY SHOOTOUT (CART)	49.95	Now	**42.50**
☐ SPEED READ PLUS (DISK)	59.95	Now	**50.50**
☐ HI-RES ADV. #0- MISSION: ASTEROID (DISK)	24.95	Now	**19.50**
☐ HI-RES ADV. #2- WIZ & PRINCESS (DISK)	32.95	Now	**29.50**
☐ CROSSFIRE (DISK)	29.95	Now	**25.50**
☐ MOUSEKATTACK (DISK)	34.95	Now	**29.50**
☐ JAWBREAKER (DISK & CASS)	29.95	Now	**25.50**
☐ THRESHOLD (DISK)	39.95	Now	**33.50**
☐ SOFTPORN ADVENTURE (DISK)	29.95	Now	**25.50**
☐ THE NEXT STEP (DISK)	39.95	Now	**33.50**
☐ FROGGER (AVAIL. FALL) (DISK & CASS)	34.95	Now	**29.50**
☐ ALI BABA AND THE FORTY THIEVES (DISK)	32.95	Now	**29.50**
☐ DELUXE INVADERS (DISK)	34.95	Now	**29.50**
☐ GALACTIC CHASE (DISK)	29.95	Now	**25.50**
☐ GALACTIC CHASE (CASS)	24.95	Now	**19.50**
☐ THE SHATTERED ALLIANCE (DISK)	39.95	Now	**33.50**
☐ GHOSTLY MANOR (AT FA2) (DISK)	24.95	Now	**19.50**
☐ PROTECTOR (DISK & CASS)	34.95	Now	**29.50**
☐ CHICKEN (DISK & CASS)	34.95	Now	**29.50**
☐ DODGE RACER (DISK & CASS)	24.95	Now	**19.50**
☐ WARLOCK'S REVENGE (DISK)	35.00	Now	**29.50**
☐ VISICALC (DISK)	250.00	Now	**219.50**
☐ WORDRACE (DISK)	24.95	Now	**19.50**
☐ ALIEN SWARM (DISK)	34.95	Now	**29.50**
☐ ALIEN SWARM (CASS)	29.95	Now	**25.50**
☐ DODGE RACER (DISK & CASS)	29.95	Now	**25.50**
☐ SNAKE BYTE (DISK)	29.95	Now	**25.50**
☐ CYCLOD (DISK)	29.95	Now	**25.50**

IBM

☐ LOST COLONY (DISK)	29.95	Now	**25.50**
☐ TEMPLE OF APSHAI (DISK)	39.95	Now	**33.50**
☐ GALAXY (DISK)	25.00	Now	**20.50**
☐ MIDWAY CAMPAIGN (DISK)	21.00	Now	**19.50**
☐ COMPUTER STOCKS AND BONDS (DISK)	25.00	Now	**20.50**
☐ VOYAGER (DISK)	25.00	Now	**20.50**
☐ DRAW POKER (DISK)	21.00	Now	**19.50**
☐ CHAMPIONSHIP BLACKJACK (AVAIL JULY) (DISK)	39.95	Now	**33.50**
☐ THE HOME ACCOUNTANT PLUS (DISK)	150.00	Now	**125.00**
☐ WRITE-ON (DISK)	129.95	Now	**110.00**
☐ EASy (EXECUTIVE ACCOUNTING SYSTEM) (DISK)	725.00	Now	**575.00**
☐ DEADLINE (DISK)	49.95	Now	**42.50**
☐ ZORK I (DISK)	39.95	Now	**33.50**
☐ ZORK II (DISK)	39.95	Now	**33.50**
☐ T.I.M. III (DISK) **("Total Information Management")**	495.00	Now	**399.00**
☐ MATHEMAGIC (DISK)	89.95	Now	**75.00**
☐ EASY SPELLER (DISK)	175.00	Now	**149.00**
☐ EASY FILER (DISK)	400.00	Now	**335.00**
☐ EASYWRITER II (DISK)	350.00	Now	**280.00**
☐ THE TAX MANAGER (DISK)	250.00	Now	**199.00**
☐ WORDSTAR (DISK)	495.00	Now	**399.00**
☐ MAILMERGE (DISK)	150.00	Now	**99.00**
☐ CONQUEST (AVAIL JULY) (DISK)	29.95	Now	**25.50**
☐ SUPERCALC (DISK)	295.00	Now	**225.00**
☐ SUPERWRITER (AVAIL JULY) (DISK)	395.00	Now	**299.00**
☐ IBM JOYSTICKS (ACCS)	64.95	Now	**55.00**
☐ GRAPHICS HARDCOPY SYSTEM (DISK)	24.95	Now	**19.50**
☐ VERSAWRITER GRAPHICS TABLET (ACCS)	299.00	Now	**250.00**
☐ DESKTOP PLAN I (DISK)	300.00	Now	**250.00**
☐ VISITREND/PLOT (AVAIL JULY) (DISK)	300.00	Now	**250.00**
☐ VISIDEX (AVAIL JULY) (DISK)	250.00	Now	**199.00**
☐ VISICALC (DISK)	200.00	Now	**175.00**
☐ VISICALC/256K (DISK)	250.00	Now	**199.00**
☐ VISIFILE (AVAIL AUGUST) (DISK)	250.00	Now	**199.00**

RAM FOR ATARI 400 + 800

48K (Reg. $299.00) *NOW* 185.00

32K (Reg. $199.00) *NOW* 85.00

SEND FOR FREE CATALOG

WE PAY SHIPPING on all software orders OVER $50 in Continental U.S. (Foreign & Air Extra). ADD $2.50 SHIPPING & HANDLING on orders under $50. CALIF. RESIDENTS ADD 6% SALES TAX. We accept MASTER CARD and VISA. C.O.D.'S ADD $5.00.

NAME ____________________

STREET ____________________

CITY ____________ STATE & ZIP ____________

CARD # ____________ EXP. DATE ____________

SIGNATURE ____________________

Outside California (800) 572-9215 (Toll Free)
or (714) 369-8113 or (714) 787-7002

3515 Bryce Way, Riverside, CA 92506

CIRCLE 196 ON READER SERVICE CARD

BUSINESS
OPPORTUNITY

Service & Maintain
Coin Operated
Micro-Computers
In Libraries

DEALER
REPRESENTATIVES
WANTED
PART OR FULL TIME

NO ROYALTIES,
NO FRANCHISE FEE

Exceptionally lucrative ground-floor opportunity to participate in the explosive Micro-Computer Market. The Computer Bus offers Community minded Micro-Computer owners the chance to develop their own successful business within a relatively short period of time with this innovative Microcomputer concept. The prognosis for success has never been better.

If you are accepted as a Computer Bus "Learning Center" Dealer you will operate your own sales and rental business from your home or office, featuring a product line of uncompromising quality and outstanding company support.

Investment required $3,000, secured by extensive computer software and hardware. Selected territory, leads, national and regional advertising, technical support and full back-up service.

For additional information call toll free
1-800-321-3670
Ohio Residents Call Collect
1-216-255-1617

the COMPUTER BUS
personal & business · computer systems

the COMPUTER BUS, 101 River St., Grand River, Ohio 44045
Authorized ATARI® Dealer

CIRCLE 142 ON READER SERVICE CARD

JRT Pascal, continued...

As mentioned, the use of separately compiled external procedures eases the size problems associated both with the compiler and the run-time program and adds no tedious details to the programmer's task. The external procedures are auto-loaded as required by the run-time program, EXC. The external procedures and functions must be declared in the main programs which reference them, and these procedure declarations and parameter lists must be consistent among different files. This is very important as the compiler will not check these declarations and validate the consistency.

The external procedures produced under the JRT compiler can access all the global variables in the main program—variables which have been declared before any procedure or function declarations.

In the example of Listing 1, CUSTOMER-LIST is a global variable. To access global variables or files, their declarations must be inserted in the external procedure file following the reserved word EXTERN, and preceding the procedure header. These declarations must be identical to the global declarations in the main program, though additional constants and type identifiers may also be present in this area.

As distinct from the original implementation of Pascal, the JRT version supports extensive capability for Input/Output control.

While the structure of a JRT Pascal external procedure is similar to a standard "internal" procedure in format, there are two minor differences. First, the PROCEDURE statement must be preceded by the word EXTERN, and second, the END statement must be followed by the standard semicolon and then a period, to signify the end of the compile unit.

Activan

JRT Pascal provides Activan, an exclusive external procedure, which monitors the execution of a Pascal program. Activan monitors the line numbers as used by the compiled program and keeps a line counter record for all numbers within the specified range. Both the range of line numbers to be monitored and their spacing may be specified, and can be changed as the program is executing.

The output of Activan is a graph showing the amount of time spent executing each portion of the program—an invaluable aid in tuning and optimizing program operation. All that is required to use the Activan facility is to compile a program with the %LTRACE directive or to set the $L switch on; the program is then run by specifying the $A switch at run-time (i.e., EXEC TESTPGM $A).

As distinct from the original implementation of Pascal, the JRT version supports extensive capability for Input/Output control. It is possible to make use of a built-in procedure, "CALL, to make direct calls to the CP/M operating system, BIOS (user dependent Basic Input/Output System), or any machine language code present in the main storage.

As a complement to this built-in procedure, JRT Pascal also provides a special purpose assembler which translates assembly code into relocatable external procedure modules. These external procedures are then automatically loaded as required at run-time just as any other external procedure.

Additionally, if a Microsoft format assembler (RMAC, or Macro-80) is available, then the CONVERT utility converts REL files produced by these assemblers into .INT format files. These files may then be accessed as external procedures. These features are not found in the "standard" implementations of Pascal, and therefore JRT Pascal is not portable to the extent that such functions are used.

As most Pascal implementations have evolved away from the original UCSD version, this lack of portability is no real handicap, and the additional features are very worthwhile.

Documentation

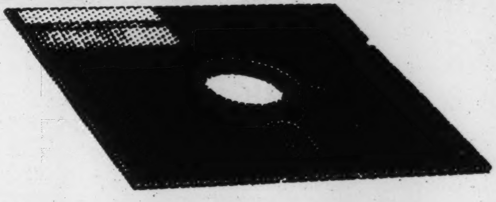
The 125-page manual is well written and complete. There are sufficient examples of all the functions that even an inexperienced user can readily make use of the advanced features. The Table of Contents is so complete that the lack of an Index is hardly noticed.

Initially, JRT Pascal was available only as a CP/M compatible program on 8" single density (IBM 3740 format) disks, but JRT Systems has informed me that the latest version is available in many popular 5 1/4" formats. Through an arrangement with Allenbach Industries, JRT Pascal may now be obtained in NorthStar, Osborne, Apple CP/M, Super Brain, and Heath soft-sector formats.

While "there is no such thing as a free lunch," JRT Pascal at $29.95 (which includes postage) certainly allows the user to experience champagne and caviar at cafeteria prices. □

CIRCLE 341 ON READER SERVICE CARD

YOU NEVER HAD IT SO SOFT!



SOFTWARE FOR YOUR ATARI, APPLE, COMMODORE OR VIC!

ATARI HOME COMPUTER PROGRAMS

HOME OFFICE	
CX404 ATARI Word Processor	$119.00
CX8102 Calculator	$29.00
CX412 Dow Jones Investment Evaluator	$99.00
CX4109 Graph It Joystick optional	$17.00
CX4104 Mailing List	$20.00
CX4115 Mortgage & Loan Analysis	$13.00
CX4103 Statistics I	$20.00
CX8107 Stock Analysis	$20.00
CXL4015 TeleLink I	$23.00
HOME STUDY	
CX4101 An Invitation to Programming I	$20.00
CX4106 An Invitation to Programming 2	$23.00
CX4117 An Invitation to Programming 3	$23.00
CX4107 Biorhythm	$13.00
Conversational Languages (ea.)	$46.00
CX4121 Energy Czar	$13.00
CX4114 European Countries & Capitals	$13.00
CX4108 Hangman, Joystick optional	$13.00
CX4102 Kindgom	$13.00
CXL4007 Music Composer	$34.00
CX4123 Scram, uses joystick	$20.00
CX4112 States & Capitals	$13.00
CX4110 Touch Typing	$20.00
HOME ENTERTAINMENT	
PAC MAN	$35.00
CENTIPEDE	$35.00
CAVERNS OF MARS	$32.00
CXL4013 Asteroids	$29.00
CXL4004 Basketball	$27.00
CX4105 Blackjack	$13.00
CXL4009 Computer Chess	$29.00
CXL4012 Missile Command	$29.00
CXL4008 Space Invaders	$29.00
CXL4011 Star Raiders	$39.00
CXL4006 Super Breakout	$29.00
CXL4010 3-D Tic-Tac-Toe	$27.00
CXL4005 Video Easel	$24.00
PROGRAMMING LANGUAGES & AIDS	
CXL4003 Assembler Editor	$47.00
CXL4002 ATARI BASIC	$47.00
CX8126 ATARI Microsoft Basic	$70.00
CXL4018 PILOT	$72.00
CX405 PILOT(Educational)	$105.00

ATARI PROGRAM EXCHANGE:	
Eastern Front '41	$25.50
Avalanche	$15.50
Outlaw	$15.50
747 Landing Simulation	$15.50
Babel	$15.50
Dog Daze	$15.50
Downhill	$15.50
Attack!	$15.50
Blackjack-Casino	$15.50
Reversi II	$15.50
Domination	$15.50
Solitare	$15.50
Disk Fixer	$15.50
Supersort	$15.50
Data Management	$15.50
Chameleon	$15.50
Instedit	$15.50
Insomnia	$15.50
My First Alphabet	$25.50
Mapware	$18.00
Number Blast	$11.50
Family Cash Flow	$15.50
Weekly Planner	$15.50
Bowler's Data Base	$13.00
Banner Generator	$11.50
Visicalc	$189.00
Letterperfect (Word Processor)	$99.00
Data Soft	
Textwizzard	$89.00
Canyon Climber	$24.00
Tumble Bug	$24.00
Shoot Arcade	$24.00
Pacific Coast	$24.00
Bishops Square	$24.00
Micro Painter	$27.00
Data Sam	$119.00
Clowns & Balloons	$24.00
Color Print	$32.00
Graphics Master	$30.00
Data Lisp	$70.00
Mail List	$20.00
OnLine	
Jaw Breaker	$27.00
MouskATTACK	$31.00
Invasion Orion	$18.50
Mission Asteroid	$22.00
The Next Step	$34.00
Softporn	$27.00
Wizzard & Princess	$29.00
Upper Reaches	$32.00
Curse of Ra	$32.00
Arcade Plus	
Ghost Hunter (cassette)	$24.00
Ghost Hunter (disk)	$30.00

K-Byte	
K-Byte Krazy Shoot Out (ROM)	$39.00
K-DOS	$69.00
K-Razy Kritters	$39.00
K-Star Patrol	$39.00
K-Razy Antiks	$39.00
Stick Stand	$6.99
Compumax	
Accounts Receivable	$110.00
General Ledger	$110.00
Inventory	$130.00
Payroll	$110.00
Personal Finance	$130.00
Synapse	
File Manager 800	$79.95
Dodge Racer	$19.00
Chicken	$24.00
Slime	$24.00
Nautilus	$24.00
Disk Manager	$24.00
Fort Apocalypse	$24.00
Assembler	$39.00
Protector	$24.00
Shamus	$24.00
Page 6	$24.00
EPYX (Automated Simulation)	
Ricochet	$14.50
Crush, Crumble & Chomp	$24.00
Star Warrior	$29.00
Rescue at Rigel	$24.00
Datestones	$16.00

APPLE

Apple Dictionary	$79.00
Visicalc	$189.00

— CALL FOR PRICES ON —

Visicalc Advance VISI FILE
Visicalc Business Forcast VISI DEX
Visischedule VISI PACK
Visiterm VISI PILOT
VISITREND

COMMODORE BUSINESS MACHINES

SOFTWARE

Word Pro 5 Plus	$319.00
Word Pro 4 Plus	$299.00
Word Pro 3 Plus	$199.00
Commodore Tax Package	$589.00
Visicalc	$189.00

Medical Billing	$449.00
The Source	$89.00
OZZ Information System	$289.00
Dow Jones Portfolio	$129.00
Pascal	$239.00
Legal Time Accounting	$449.00
Word Craft 80	$289.00
Power	$79.00
Socket-2-Me	$20.00
Jinsam	$Call
MAGIS	$Call
CPA	$Call
Real Estate Package	$Call
The Manager	$209.00
Softrom	$129.00
BPI Inventory Control	$319.00
BPI Job Costing	$319.00
BPI Payroll	$319.00
BPI General Ledger	$329.00
Creative I SAM	$79.00
Creative General Ledger	$229.00
Creative Accounts Receivable	$229.00
Creative Inventory	$229.00

VIC 20

VIC1901 VIC AVENGERS	$23.00
VIC1904 SUPERSLOT	$23.00
VIC1906 SUPER ALIEN	$23.00
VIC1907 SUPER LANDER	$23.00
VIC1908 DRAW POKER	$23.00
VIC1909 MIDNIGHT DRIVE	$23.00
Terminal 40 col. exp.	$Call
UnWord	$13.00
Grafix Menagerie	$11.00
VIC PICS	$15.00
Ticker Tape	$13.00
Banner Headliner	$13.00
RS 232	$39.00
VT 106A Recreation Pack A	$44.00
VT107A Home Calculation Pack	$44.00
VT164 Programmable Character/ Gamegraphics	$12.00
Household Finance	$27.00
VIC Games	$19.00
VIC Home Inventory	$13.00
VIC Rec/Ed II	$13.00
VL101 Introduction to Computing	$19.00
VL102 Introduction to BASIC Programming	$19.00
VM110 VIC20 Programmers Reference Guide	$15.00

computer mail order

east
800-233-8950
477 East Third Street
Williamsport, PA 17701
(717) 327-9575

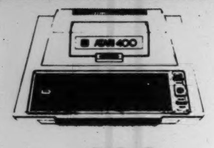
CALL TOLL FREE

In-stock items shipped same day you call. No risk, no deposit on C.O.D. orders. Pre-paid orders receive free shipping within the continental United States with no waiting period for certified checks or money orders. All prices shown are cash prices add 3% for Mastercard and Visa. NV and PA residents add sales tax. All items subject to availability and price change.

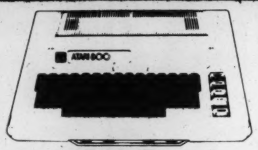
west
800-648-3311
P.O. Box 6689
Stateline, Nevada 89449
(702) 588-5654

CIRCLE 146 ON READER SERVICE CARD

computer mail order west



ATARI



400

16K ...	$249
32K ...	$369
48K ...	$469

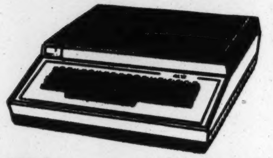
800

16K ...	$649
32K ...	$724
48K ...	$769

410 Recorder	$76.00
810 Disc Drive	$449.00
822 Printer	$269.00
825 Printer	$589.00
830 Modem	$159.00
820 Printer	$259.00
850 Interface	$169.00
CX40 Joy Stick	$18.00
CX853 16K RAM	$77.95

Microtek 16K RAM	$74.95
Microtek 32K RAM	$119.95
Ramdisk (128K)	$429.95
Intec 48K Board	$219.95
Intec 32K	$119.95
One year extended warranty	$70.00
481 Entertainer	$69.00
482 Educator	$130.00
483 Programmer	$49.00
484 Communicator	$344.00

FRANKLIN ACE 1000



64K Personal Computer
Hardware, software and peripheral compatable with the Apple II and even has some features not found on the Apple.

MICRO-SCI Apple II/Franklin compatable Disk Drives!

Call now for best price!!

HOT ATARI GAMES

PAC-MAN	$35.00
Centipede	$35.00
Caverns of Mars	$32.00
Asteroids	$29.00
Missile Command	$29.00
Star Raiders	$39.00
Canyon Climber	$25.00
Protector	$24.00
Mouskattack	$31.00
Jawbreaker	$27.00
Ghost Hunter	$24.00

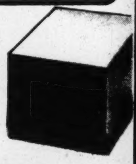
K-BYTE
ROM CARTRIDGE GAMES FOR YOUR ATARI

Krazy Shoot Out	$39.00
K-razy Kritters	$39.00
K-razy Antics	$39.00
K-star Patrol	$39.00

STICK STAND
$6.99

ARCADE ACTION FROM YOUR ATARI JOYSTICK

PERCOM



Finally, a dual disk drive for the Atari 800/400. Both single and dual drive models read both sides of the disk! Will read all disks written for Atari 810. *CALL FOR INTRODUCTORY PRICE!*

Telecommunications Modems

Hayes	
Smart	$239.00
Chronograph	$199.00
Micromodem II	$279.00
Micromodem 100	$309.00
Novation Auto	$239.00
D Cat	$169.00
Cat	$159.00
Anchor Modem	$79.00

AMDEK MONITORS

300G	$169.00
Color I	$339.00
Color II	$699.00
Color III	$429.00

OTHERS

Zenith 9" (Green)	$109.00
BMC 12" Green	$85.00

NEC
COMPUTERS

8001-A	$749.00
8031	$749.00
8012	$549.00

PRINTERS

8023	$549.00
7710/7730	$2399.00
3510/3530	$1789.00

MONITORS

JB-1201	$179.00
JC-1201	$349.00
JC-1202	$899.00
SANYO 1000 COMPUTER	$1599.00

VISICORP

VISICALC	
Apple II +	$189.00
Atari	$189.00
Commodore	$189.00
IBM	$189.00

Also available are:

VISIDEX	VISIPLOT
VISIFILE	VISITERM
VISIPACK	VISITREND

SOFTWARE

We stock manufacturer's and third party software for most all computers on the market! Call today for a copy of our new

CATALOG

You'll find programs by Atari, APX, Data Soft Crystal Software, EPYX, Synapse, OnLine, Arcade Plus, K-BYTE, Magis, Canadian Micro, Professional Software, Creative Software, BPI, VISICORP, Commodore, NEC and of course our own!

Maxell Disks

MD I (box of 10)	$36.00
MD II (box of 10)	$46.00
MFD I (8")	$44.00
MFD II (8" Double Density)	$54.00
Syncom (box of 10)	$29.00

Computer Covers

Atari 400	$6.99
Atari 800	$6.99
Atari 810	$6.99
Commodore VIC-20	$6.99
Commodore 8032	$14.99
Commodore 8050/4040	$10.99

west 800-648-3311

In Nevada
CALL
(702)588-5654

P.O. Box 6689
Stateline,
NV. 89449

HEWLETT PACKARD

HP•85 $1969

HP•87	$1799.00
HP•125	$1999.00
HP•85 16K Memory Module	$169.00
5¼" Dual Master Disc Drive	$1799.00
Hard Disk w/ Floppy	$4349.00
Hard Disk	$3549.00
"Sweet Lips" Plotter	$1199.00
80 Column Printer	$649.00

CBM 8032 $999

Commodore Business Machines

Word Pro 5+	$319.00
Word Pro 4+	$299.00
Word Pro 3+	$199.00
The Administrator	$379.00
InfoPro Plus	$219.00
Power	$79.00

CBM 64	CALL
4032	$969.00
8096 Upgrade Kit	$369.00
Super Pet	$1599.00
2031	$529.00
8250 Doubled Sided Disk Drive	$1699.00
D9060 5 Megabyte Hard Disk	$2399.00
D9090 7.5 Megabyte Hard Disk	$2699.00
8050	$1299.00
4040	$969.00
8300 (Letter Quality)	$1799.00
8023	$769.00
4022	$499.00
Pet to IEEE Cable	$37.00
IEEE to IEEE Cable	$46.00
Tractor Feed for 8300	$240.00

HEWLETT PACKARD

HP 41CV CALCULATOR $239

HP 41C	$189.00
HP 11C	$79.00
HP 12C	$114.00
NEW 15C	$119.00
NEW 16C	$125.00

HPIL PERIPHERALS IN STOCK!

Televideo Terminals

910	$579
912C	$699
920C	$749
925C	$749
960	$950

802	$Call
802H	$Call
816	$Call
806	$Call

VIC 20 $179

VIC 1530 Commodore Datassette	$69.00
VIC 1540 Disk Drive	$499.00
VIC 1515 VIC Graphic Printer	$339.00
VIC 1210 3K Memory Expander	$32.00
VIC 1110 8K Memory Expander	$53.00
16K VIC Expansion	$94.00
VIC 1011 RS232C Terminal Interface	$43.00
VIC 1112VIC IEEE-488 Interface	$86.00
VIC 1211 VIC 20 Super Expander	$53.00
VIC Mother Board	$99.00

EPSON PRINTERS

MX 80 w/Graftrax	$449
MX 80 FT III	CALL
MX 100	CALL
ADA 1600 Parallel Printer to CBM	$119.00
ATC-1 Parallel Printer to Atari	$29.00
AP-80 Apple Parallel Card & Cable	$69.00
IBM-1 Parallel Printer to IBM	$32.00

TEC PRINTERS

Starwriter	
F10-40CPS	$1399.00
F10-55CPS	$1749.00
Prowriter 8510A	$499.00
Prowriter 1550	$799.00
ADA 1450 Serial Printer to CBM	$119.00
ATC-2 Serial Printer to Atari	$29.00
AP-S10 Apple Serial Card & Cable	$95.00

Smith-Corona TP-I $649

Letter Quality
Daisy Wheel
12 CPS Text Printer

In-stock items shipped same day you call. No risk, no deposit on C.O.D. orders. Pre-paid orders receive free shipping within the continental United States with no waiting period for certified checks or money orders. All advertised prices include a 3% cash discount from normal credit card prices. NV and PA residents add sales tax. All items subject to availability and price change.

CENTRONICS PRINTERS

739-1	$519
739-3	$619
2 Meter RS232-RS232 Cables	$29.95

— ALSO —

Diablo 630 Special	$1799.00
Talley 8024-L	$1629.00
IDS Prism	CALL
Daisywriter	CALL

OKIDATA PRINTERS

82A	$469.00
83A	$599.00
84 Parallel	$1099.00
84 Serial	$1249.00

NOTE
Okidata 82A and 83A Printers come equipped with both parallel ports & RS232 Serial ports.

ADDITIONAL MANUFACTURER'S DISCOUNTS AVAILABLE TO QUALIFIED EDUCATIONAL INSTITUTIONS

800-233-8950 east

477 E.
THIRD ST.
Williamsport
PA 17701

IN PA
CALL
(717)327 9575

computer mail order east

CIRCLE 146 ON READER SERVICE CARD

Programming in Pascal

Greg Greene

So, you say you are fed up with the different dialects of Basic. You have had enough of its slow execution times, of having to fill up memory space with REM statements so you won't become tangled in the variable jungle. Your GOTO statements sometimes lead off to Fantasy Island and your GOSUB and FOR... NEXTs are for the birds. In short, your program structure is about as solid as the kids' first tree house and you want out of the whole mess.

After reading all the reviews and articles you have decided to step up to structured programming and take part in the new wave that the ads tell you is sweeping the world of micros and minis. You have decided to hop on board the Pascal wagon and find a better way of doing things.

Zipping down to the local computer book store you return with a bushelful of manuals and texts on Pascal and settle down to learn. However, it has been a long time since graduation, and you can't seem to pick up the information from the printed page as easily as you once did.

You need help. You need a teacher. You need an audio-visual presentation of the fundamentals of the language. Well friend, here it is.

Just such a course is now available from the Heath/Zenith folks, at your local Heathkit store or Heath/Zenith Data Systems dealer. The course is entitled, "Programming in Pascal, an individual learning course." It consists of a 510-page manual and five cassette tapes. The tapes, of course, provide the audio and the manual the visual part of the instruction.

Of special interest is the way the material is presented. The manual consists of several lessons which break the material into easily digested parts. The manual is *not* just a printed version of the material on the tape. The authors have used the instructional techniques that work best on paper in the manual, and those that work best in audio on tape.

The pages of the manual do not consist of mere words; they incorporate overhead projections and flip charts. That is not to say that the actual film is presented. It isn't, but the page looks as the film would when projected. In fact, I believe that you could reproduce the page for projection purposes if you desired. In any case the effect is the same as sitting in a classroom.

The audio tapes are keyed to the text. You are told which tape to use, and when to turn it on. The voices on the tape are both pleasant and well modulated—one male and one female. I defy you to fall asleep while listening to it. Both speakers are very good.

The course presents standard Jensen and Wirth Pascal. It is divided into 10 modules. The tapes are approximately 30 minutes in length, and the lessons take about two hours each to complete.

A final examination is provided, and at the conclusion of the course you send it to Heath to be marked. Credits can be assigned upon successful completion of the course. These are Continuing Education Credits, and I believe they are recognized by some, if not all, colleges in Michigan. Now let's take a look at what the course offers.

Module One is an introduction to the course and describes the structure of a simple Pascal program. Constants and variables are defined along with expressions. Input and Output statements are examined at the conclusion of this module. You learn the difference between write and writeln, for example.

At the beginning of the module, the goals are clearly set forth, along with a list of the new words in that lesson. At the

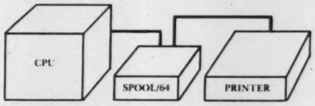
Greg Greene, 207-885 Craigflower Rd., Victoria, B.C. Canada, V9A 2X4.

How many times must your computer stop just to talk to your printer?

Your computer talks faster than your printer can listen. Expensive time is lost forever. SPOOL/64, a 64k byte hardware print spooler, keeps your computer processing while your printer is printing. No more waiting. No more wasting.

SPOOL/64 buffers your print output and transmits the information to your printer at the printer's specific print rate. It buffers up to 13 minutes of print output (at 80 characters per second).

SPOOL/64 plugs directly into both your printer and computer, accepts input from parallel centronics cables (serial RS-232 available soon), and its user programming feature allows you to download your own programs so SPOOL/64 can handle sophisticated print routines. And SPOOL/64, used with your software spooler, can give you the highest performance spooling available.



SPOOL/64
RESET
Apparat,Inc.

SPOOL/64 utilizes 64k of dynamic RAM, a Z-80 CPU, a 2716 ROM and a copy of the source program for the object code in the ROM is included.

SPOOL/64, priced at just ~~$399,~~ $319 is the most cost/effective print spooler on the market. Evaluate performance. Evaluate price. Then let SPOOL/64 get your computer back talking to you. Call or write Apparat today for a free brochure. Dealer inquiries invited.

BASED ON INCREASED PRODUCTION WE HAVE LOWERED THE PRICE 20%. SPOOL/64 NOW $319.

VISA MasterCard

Apparat, Inc.

4401 So. Tamarac Parkway, Denver, CO 80237 (303) 741-1778

"ON GOING SUPPORT FOR MICROCOMPUTERS"

CIRCLE 109 ON READER SERVICE CARD

conclusion of the module there are self-tests and exercises.

If you have a Pascal language installed on your computer, you can follow along with the course using it. Because of the different types of editors available for the different systems, you will need to familiarize yourself with the one that works on your system, before trying to write a program.

Frame 2

LEARNING OBJECTIVES

GOALS: When you complete this module, you will be able to:

1. Identify and write procedures with parameters that:

   A. Are complete and correct, and
   B. Perform the desired tasks.

2. Identify different parameter-passing mechanisms.

3. Apply scoping rules to determine how and what objectives are handled inside and outside of a procedure.

4. Choose the right parameter type for a given problem solution.

5. Use arrays as parameters correctly.

6. Understand and use recursion.

VOCABULARY:

Parameter, value parameter, variable parameter, parameter list, passing a parameter, arrays as parameters, packed arrays, recursion, recursive call, formatting instructions, functions as parameters, procedures as parameters, specifier, **var, function, procedure**, parameter specifications.

Restart the tape.

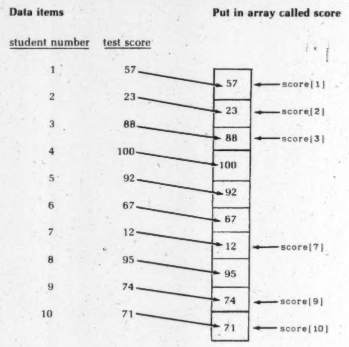
Module Two introduces the concepts of procedures and functions, and describes the rules of scope as defined for standard Pascal. This lets you visualize the use of global and local variables and constants. It is one of the great strengths of Pascal that variable and constant values need not be passed through the whole program, unless desired. As with all the modules, self-tests and exercises enable you to determine if you have mastered the material.

Module Three introduces the IF...THEN...ELSE statement, CASE statement, and Boolean objects. These are the decision making statements of Pascal. They are very similar to Basic and should present no difficulty to anyone with a knowledge of Basic, or, indeed, anyone who is learning Pascal as his first language. The authors make good use of flow charts in this module, and thus encourage their students to use them in their own programming.

Module Four is entitled "Looping" and presents the three types of loops: REPEAT...UNTIL, WHILE...DO, and the familiar FOR...NEXT. Although similar, these three loops have definite jobs and different ways of testing for the end of the loop.

Frame 6

FROM DATA ITEMS TO ARRAY



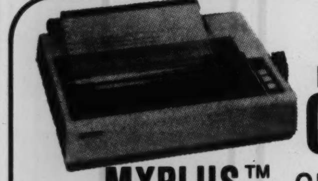
Exercises

What is contained in

1. `score[8]` ?
2. `score[6]` ?
3. `score[1]` ?

Check your answers in "Back-Up 3."

Module Five defines the various data types available in Pascal. Pascal provides for many different types of data as a function of the language, and even allows you to define your own. The language also has pre-defined functions that allow for quick and easy manipulation of the data.



EPSON
MX-80 AND MX-100
OWNERS

MXPLUS™ GIVES YOU CONTROL OF YOUR PRINTOUT

- SELECT CONDENSED, **BOLD,** OR WIDE PRINT **INSTANTLY** USING THE PRINTER PANEL BUTTONS. (NO COMPUTER CONTROL CODES REQUIRED)
- ACTIVATE PERF-SKIP AND LEFT MARGIN INDENT TO **AUTOMATICALLY** FORMAT YOUR PRINTOUT INTO NEAT PAGES THAT CAN BE PUNCHED AND BOUND.

MXPLUS™ INSTALLS IN MINUTES, NO SOLDERING!

MXPLUS IS A PLUG-IN MODULE FOR ALL EPSON MX-80/100 PRINTERS AND IS COMPATIBLE WITH ALL INTERFACE BOARDS. MXPLUS HAS A 1 YEAR WARRANTY.

ORDER TODAY

ORDERS CALL 24 HR. 800-835-2246 x441
INFORMATION CALL 213-969-2250

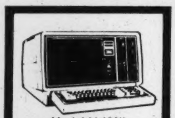
DRESSELHAUS COMPUTER PRODUCTS
BOX 929
AZUSA, CALIFORNIA 91702

ONLY
$49.95
POSTPAID CALIF. ADD 6%
SAME DAY SHIPPING
WITH MC/VISA

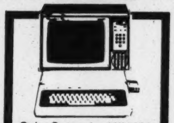
CIRCLE 167 ON READER SERVICE CARD

From Computer Plus to YOU . . .

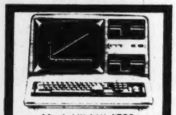
PLUS *after* PLUS *after* PLUS



Model 16 128K
1 Drive $4199
2 Drive $4799



Color Computer 16K $305
w/16K Ext. Basic $399
w/32K Ext. Basic $499



Model III 16K $799
Model III 48K
2 Disk & RS232 c $1949

Okidata 82A $425

Color Computer Disk Drive
Drive 0 $470 Drive 1 $315

Smith Corona TPI
Daisy Wheel $599

BUY DIRECT *Here are just a few of our fine offers . . . call TOLL FREE for full information.*

COMPUTERS	
Model II 64K	$3100
Model III 4K LEV I	599
MODEL III 16K	799
MODEL III 32K	856.50
*MODEL III 32K	831.50
MODEL III 48K	914
*MODEL III 48K	864
Model III 48K 2 Disk & RS232 c	1949
†Model III 48K 2 Disk No RS232 c	1749
Color Computer 16K	305
Color Computer 16K w/extended basic	399
Color Computer 32K w/extended basic	499
‡Color Computer 32K-64K w/extended basic	510
Pocket Computer 2	230
Model 16 1DR 128K	4199
Model 16 2DR 128K	4799
DT-1 Data Terminal	599

MODEMS	
Lynx Direct Connect MI/MIII Auto Ans./Dial	235
Telephone Interface II	169
R.S. Modem I D.C.	130
R.S. Modem II D.C.	210
PRINTERS	
Daisy Wheel II	1695
Smith Corona TPI Daisy Wheel	599
Epson MX80	CALL
Epson MX80 FT	CALL
Epson MX100	CALL
Line Printer VII	249
Line Printer VIII	620
Line Printer V	1610
Microline 80	325
Microline 82A	425
Microline 83A	699
Microline 84 Parallel	1090
P. C. Plotter Printer	199

*Computer Plus New Equipment with NEC RAM installed 180 Day Computer Plus Warranty

DISK DRIVES	
R.S. Model III 1ST-Drive	679
Traxx Tandon 40 Track MI	289
Color Computer Drive 1	315
Color Computer Drive 0	470
Primary Hard Disk	3999
ETC.	
Verbatum 5" Double Density	32
Verbatum 8" Data Life	49.95
Ctr-80A recorder	52
C. C Joysticks	22
16K RAM N.E.C. 200 N.S. chips	15
64K Ram Chips	75
Color Computer Flex D.O.S.	99
R.S. Software 10% off list	

†MIII R.S. Drive 0 Tandon Drive 1

‡Color Computer 64K requires Disk 0 and Flex D.O.S.

We have the lowest possible Fully Warranteed Prices AND a full complement of Radio Shack Software.

Prices subject to change without notice
Not responsible for typographical errors
TRS-80 is a registered trademark of Tandy Corp

call TOLL FREE 1-800-343-8124

computer plus

480 King Street
Littleton, MA 01460
617-486-3193

Write for your free catalog

CIRCLE 147 ON READER SERVICE CARD

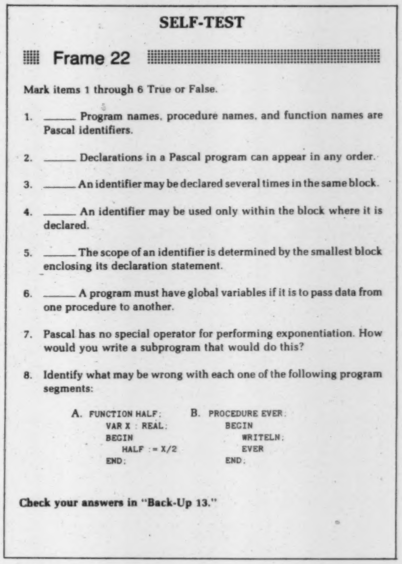
Module Six deals with arrays. Basic provides, in most of its implementations, for extensive manipulation of arrays in much the same manner. The manner of declaring them is different, but accessing a given element is the same as in most Basics. If you know how to use the arrays in Microsoft Basic, this section should seem familiar to you.

Module Seven explains how values are passed to procedures and recovered. It is similar to the way in which defined functions are used in Basic. The use of recursive procedures is also explained here. Recursion is a very powerful programming tool, and this part of the course will help you learn to use it to good advantage.

Module Eight introduces records and sets. The visualization of sets was the most difficult part of the course for me to handle. I guess I couldn't believe that so much could be done with so little effort. By manipulating a single record, all the fields associated with it can also be manipulated. I don't know of any similar construction in Basic other than the INSTRING function. I plan to do a great deal of experimentation on this concept alone.

Module Nine discusses pointers. The use of pointers in Pascal allows the rapid access of data from several storage areas. You can create trees, stacks, queues and linked lists with ease. There are several predefined functions to help you in Pascal.

The use of pointers is another area that wasn't easy for me. I don't think I would have been able to master it at all just by reading. The tape is what made it clear in the end.



SELF-TEST

Frame 22

Mark items 1 through 6 True or False.

1. ______ Program names, procedure names, and function names are Pascal identifiers.
2. ______ Declarations in a Pascal program can appear in any order.
3. ______ An identifier may be declared several times in the same block.
4. ______ An identifier may be used only within the block where it is declared.
5. ______ The scope of an identifier is determined by the smallest block enclosing its declaration statement.
6. ______ A program must have global variables if it is to pass data from one procedure to another.
7. Pascal has no special operator for performing exponentiation. How would you write a subprogram that would do this?
8. Identify what may be wrong with each one of the following program segments:

```
A. FUNCTION HALF;          B. PROCEDURE EVER;
     VAR X : REAL;               BEGIN
     BEGIN                          WRITELN;
        HALF := X/2                 EVER
     END;                        END;
```

Check your answers in "Back-Up 13."

Module Ten presents files. Pascal, in its standard implementation, allows the use of only sequential files. This is not surprising since at the time it was written, the prevalent storage medium was magnetic tape. Thus, the use of pre-defined procedures such as REWRITE reflect the naming conventions of an earlier age.

This chapter deals only with the use of sequential files as implemented in standard Pascal. UCSD Pascal allows the implementation of random access, and the student is referred to several texts at the end of the chapter. After completing the course, he should be able to pick up any book on the implementation of UCSD Pascal and have little difficulty with it.

Programming in Pascal is written and presented as I wish my high school courses had been. It pays attention to instructional techniques, and while there may be some people who will not be able to absorb Pascal from this course, I think they are probably few and far between.

I think the course is good value for the $159 price, especially given Heath's money back guarantee. I didn't check their guarantee provision, because I had no reason to return it; it worked for me.

Heath/Zenith, Benton Harbor, MI 49022. ☐

Version 4.0

The Ultimate APPLE® Utility Program

COPY II PLUS

Now you can back up your protected software. Copy II Plus is the most sophisticated bit copy program available. It handles synchronized tracks, half tracks, nibble counting, bit insertion and other protection schemes. It also includes a comprehensive discussion of disk format and protection techniques, and instructions on how to back-up dozens of popular programs. A disk system and speed check assure your drives are running in top condition and a nibble editor will allow you to repair damaged diskettes, analyze protection schemes, etc.

The last DOS utility disk you will need. Fully menu driven, the Copy II Plus utilities include a catalog display with binary file addresses and lengths, a disk usage map, and the ability to verify and compare files for differences. It can copy, lock, unlock and delete files and DOS can be copied, or removed from a disk to free up space. You can change the greeting program on a DOS disk, or initialize a disk from scratch. The Copy II Plus sector editor will allow you to view and modify data in either hex or ASCII format.

For your convenience, Copy II Plus is not copy protected for backup.
Available at fine computer and software stores or direct from:

Central Point Software, Inc.

P.O. Box 19730-203
Portland, OR 97219
(503) 244-5782

$39.95

Attention current Copy II Plus owners: Return your original disk with $19.95 for an update to Version 4.0.

CIRCLE 131 ON READER SERVICE CARD

Alternative Languages for the Color Computer

Scott L. Norman

The Radio Shack TRS-80 Color Computer is something of a sleeper among personal computers. Although the manufacturer has promoted it primarily as a games machine and household computer, devotees know it to be much more powerful and flexible than this would indicate.

The Motorola 6809 represents just about the last word in 8-bit microprocessor technology, for example, and Extended Color Basic is a potent, graphics-oriented language with all of the experience and expertise of Microsoft behind it.

Basic isn't the whole world, though. Its lack of speed is a problem for every writer of games or simulation programs, and its syntax encourages the kind of unstructured programming against which computer scientists rebel. Fortunately, software developers have begun to produce a variety of alternative languages from which Color Computer owners may choose.

In this review I will describe the ones with which I am familiar. I am almost certain to miss one or more, if only because of the time lapse between the submission and publication of this piece. (*See the review of EDTASM+ in this issue*—Ed.) Still, I hope that at least some of this material will be news to you.

First, a few words of warning. Space (and time) limitations restrict the amount of detail which I can present on any single language and while I hope to spark some interest among Color Computer users who are not computer science pros, this article is a long way from being a tutorial.

It will probably become obvious that my interest lies in high level languages, although I will also try to summarize the assemblers available for the Color Computer.

Where speed is important, such as in real-time handling of I/O or graphics, assembly language has a lot going for it.

Finally, I should point out that most of the new languages for the Color Computer actually available at the time this is being written are fairly restricted subsets of their parent languages.

Since Extended Color Basic is a powerful, mature dialect, why should one bother with the alternatives at all?

I can think of two reasons. First, programming languages can be intrinsically interesting. There is probably no better way to learn about a new language than to set your hands on your own copy of a compiler, interpreter, or whatever, and begin to experiment.

The second reason is a little more nebulous, but it goes something like this. The languages we use to describe problems influence the way we think about the problems themselves, and may even affect the solutions we are able to find. This holds for programming languages as well as for other formal systems. Therefore having several languages available is akin to having a variety of tools of any kind — it may help you do a particular job in a better, more efficient, or more illuminating manner.

The Assemblers

So much for the sermon. I'll begin this review of alternative languages with a tabulation of tools for a language which isn't really an "alternative" at all, but which is instead closely related to the intrinsic structure of the 6809: assembly language.

Purists claim that only those who write in assembly are entitled to call themselves programmers; everyone else is just a coder, setting up data for a real program (i.e. an interpreter or compiler) to manipulate.

Be that as it may, assembly language does allow one to gain really intimate control over a computer. The drawback is that it requires a corresponding depth of knowledge about the structure and operation of the machine.

Let's get the nomenclature straight. Microprocessors execute only binary machine language instructions, but like all computers of interest, the Color Computer incorporates a loader routine which accepts hexadecimal input. Thus it is common to speak of the hex representation as

---

Scott L. Norman, 8 Doris Road, Framingham, MA 01701.

KNIGHT of DIAMONDS
WIZARDRY™

THE SECOND SCENARIO

The Wizardry Adventure Continues! Barbarians gather, preparing to sack the city of Llylgamyn. News that the mighty staff of Gnilda has been reclaimed by its earthgod creator has travelled fast. Protected for a thousand years by the power of the wonderous artifact, and now defenseless, Llylgamyn is doomed, unless you help!

What have people said about the first scenario?

. . . [Wizardry] has the potential to become a classic.
David Lubar, *Creative Computing*

The most eagerly awaited adventure . . .
Computer Merchandising

. . . perhaps the most advanced adventure program on the market.
Forest Johnson, *The Space Gamer*

The amount of detail is fantastic.
Neil Shapiro, *Popular Mechanics*

Knight of Diamonds, a challenging scenario for experienced *Wizardry* players (13th level characters will barely survive!).

Proving Grounds of the Mad Overlord (shown at right) and *Knight of Diamonds* operate on **any** Apple Computer* with at least 48K, DOS 3.3, and 1 disk drive.

Proving Grounds of the Mad Overlord—**$49.95**

Knight of Diamonds—**$34.95**

MasterCard VISA C.O.D.

Join over ten thousand adventurers exploring the ultimate fantasy experience.

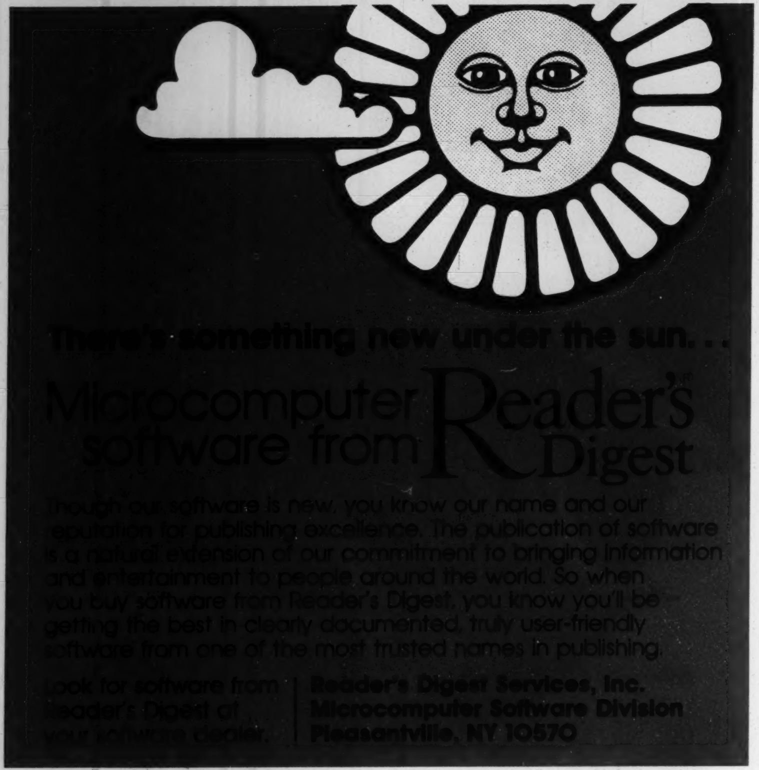
Shipping $2.00 in U.S.; $5.00 outside U.S.

NOW AVAILABLE AT YOUR LOCAL COMPUTER AND HOBBY STORE

*APPLE IS A REGISTERED TRADEMARK OF APPLE COMPUTER, INC.

Sir-tech SOFTWARE, INC.
6 MAIN STREET, OGDENSBURG, N.Y. 13669
(315) 393-6633

CIRCLE 275 ON READER SERVICE CARD

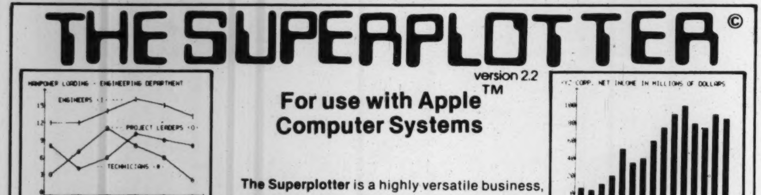

There's something new under the sun. . .
Microcomputer software from Reader's Digest

Though our software is new, you know our name and our reputation for publishing excellence. The publication of software is a natural extension of our commitment to bringing information and entertainment to people around the world. So when you buy software from Reader's Digest, you know you'll be getting the best in clearly documented, truly user-friendly software from one of the most trusted names in publishing.

Look for software from Reader's Digest at your software dealer.

Reader's Digest Services, Inc.
Microcomputer Software Division
Pleasantville, NY 10570

CIRCLE 260 ON READER SERVICE CARD



For use with Apple™ Computer Systems

The Superplotter is a highly versatile business, engineering, educational, math and graphics applications package featuring:

Standard Bar Graphs•Point and Line Graphs•Graphics Display of any Mathematical Function•Least Squares Polynomial Curvefit Generation•Keyboard Image Shape Tables and User Tutorial•Automatic Graphics Disk Storage and Recall•Data File Editor•Automatic Disk Storage and Recall of Editor Data Files•Overlay Modes•Graphics Screen Text Editor

Data may be input directly or from previously generated data files. Comprehensive documentation is provided including printer dump instructions and directions for accessing data bases created by other programs. Requires Applesoft and one DOS 3.3 disk drive.

$69.95

See your local dealer for a demonstration or order direct from:

Dickens Data Systems
478 Engle Dr. / Tucker, Ga. 30084 / (404) 491-7905
outside Georgia:
(800) 241-6753 ext. 503
C.O.D., VISA, & MasterCard accepted.
Mail Orders: Add $2.50 for shipping and handling ($5.00 outside the USA)

General Purpose Plotting

Statistical Data Analysis Forecasting Tool

Decision Making Tool

Extensive Overlay Capabilities

Visual Aid for Presentations

Plot Anything

Perfect for Professional Quality Reports

Plot Keyboard Characters on Any Graphics Display Simply

CIRCLE 164 ON READER SERVICE CARD

Alternatives, continued...

machine language. The hex version of a routine can be loaded directly into any specified portion of memory with a monitor program. Alternatively, the hex characters can be converted to decimal in the fashion appropriate to the Color Computer and read from DATA statements.

Few people would care to do this for routines of any length, though, and fewer still would care to write programs from scratch in machine language. The code simply isn't meaningful to read, and it becomes very difficult to keep track of such things as the assignment of memory locations.

Assembly language comes to the rescue. It allows the programmer to use mnemonics to represent instructions, memory locations, registers, and subroutines, while retaining detailed control over machine operation. It is far easier, for example, to use the mnemonic ADDA to add the contents of a specified memory location to Accumulator A than it is to remember that BB is the machine language instruction which does this.

The usual procedure is to use a text editor to prepare the assembly language "source program" in the familiar columnar format. The source code is usually saved on tape or disk and subsequently read by the assembler program and translated into machine language. The output of the assembler, the "object program," is in turn loaded and run to execute the program.

Assemblers frequently require multiple passes (readings of the source code) to accomplish the translation. For example, the first pass might be used to construct a symbol table, a listing in RAM of user-defined names for special memory locations or parameters. The second pass would then perform the actual source code translation. Some assemblers permit "assembly direct to memory," which means that the object code could be executed at this stage. In other cases, the object code must be stored and subsequently loaded into RAM to be executed.

Table 1 is a listing of assemblers for the Color Computer; the vendor codes are explained in Table 4. There are several interesting things about this tabulation. For one, there is considerable diversity in price and in the minimum system required to support the various packages. There is also a great diversity in the features offered, which I will discuss in a moment. Another point: all of these programs except EDTASM+, which was released too late to be included in this review, are the products of independent vendors.

STAR MAZE

Star Maze, a tour-de-force of hi-res animation and graphics. Yours is a desperate mission—to find and recover the power jewels hidden in the maze before your fuel runs out.

Star Maze features animation effects never seen before on an Apple as well as the fine touches that mark it as a Sir-tech game.

- huge 18 color multi-directional maze
- 16 maze levels
- playable by keyboard, paddles, joystick or joyport
- high scores saved to [illegible]
- and more . . . all for [illegible]4.95

Programmed by Gordon Eastman from an original [illegible] by Robert Woodhead

**NOW AVAILABLE AT YOUR LO[illegible]
COMPUTER AND HOBBY [illegible]**

MasterCard

Shipping [illegible]

SOFTWARE THAT COMPLIMENTS YOUR INTELLIGENCE

SIR-TECH SOFTWARE INC.
6 MAIN STREET
OGDENSBURG, N.Y. 13669
(315) 393-6633

CIRCLE 276 ON READER SERVICE CARD

INTRODUCING

SAVVY™

. . . the PERSONAL LANGUAGE™ system that mirrors your commands using your own words!

What SAVVY is —

- SAVVY is a miraculous new information handling system.
- SAVVY is an automatic database management system.
- SAVVY is a new level of machine intelligence.
- SAVVY, part hardware, part software, is the beginning of truly "Personal Computing".

SAVVY
PERSONAL LANGUAGE

Trademark: SAVVY, Robot Programmer: Excalibur Technologies Corporation.

Personal Language: SAVVY Marketing International.

What SAVVY does —

Through SAVVY, you and your computer talk to each other in your own natural, conversational English (or Spanish, or French, etc.).

It learns from you what you want done in your own personal language.

Once SAVVY learns your language it can create any file you wish. Input, output, additions, changes and deletions are arranged for you.

SAVVY's "Robot Programmer" has been trained to write 100% of the programs needed to manage your database information.

SAVVY runs on CP/M™ and Apple DOS.

What YOU discover —

You'll discover that SAVVY recognizes your personal words, even if misspelled, or even if you use a phrase never used before!

SAVVY continues to grow through use to become better and better at understanding your commands.

Eventually, you will see SAVVY as a mirror to your own way of thinking and working. It is a re-definition of "user-friendly".

SAVVY, it's the first system that truly means "personal computing".

SAVVY is like no other system on earth.

SAVVY cost $950.

Seeing is believing. SAVVY is on display at selected computer retail locations. Call for the name of your nearest dealer.

CP/M is a trademark of Digital Research Corp.

Apple is a Trademark of Apple Computer Inc.

CIRCLE 270 ON READER SERVICE CARD

100 South Ellsworth Street, 9th Floor, San Mateo, CA 94401 (415) 340-0335

SAVVY

MARKETING INTERNATIONAL

Let's take a closer look at the table. I have tried to indicate which assemblers need an additional editor for source code preparation, to give you a feeling for total system cost. If you plan to do a great deal of assembly language programming, you may well want to investigate those packages which include co-resident editors. They can save a great deal of tape or disk swapping during the early stages of program development, when you will probably be correcting syntax and logic errors. (Or are you in the habit of writing perfect code from the beginning?)

As you can see, assemblers come in all three program configurations supported by the Color Computer — cassette, disk, and ROM pack. To my knowledge, all of them support the standard Motorola mnemonic set for the 6809. Some offer greater flexibility and additional features, however.

Frequently mentioned in this regard are the ability to handle local labels and conditional assembly. The former refers to labels for variables, etc., which are defined only within a particular section of a program and which can be re-used elsewhere. Conditional assembly allows different versions of a program to be assembled starting from the same source code, the modifications being dependent on parameters defined at assembly time. This clearly encourages programmers to develop their own libraries of frequently-used subroutines which can be patched together to build complex programs.

What about those entries for 64K systems? Conventional wisdom has it that Color Computers are limited to 32K of RAM, but it is well known that the Radio Shack 32K modification is accomplished with 64K memories, jumpers selecting one bank of 32K from each chip. Provided that both banks are good, a simple wiring change allows a re-mapping of the memory address space. The Basic ROMs are switched out of the circuit, and the entire 64K of RAM is made available to the user (except for a few hundred bytes required for a loader program). At this point, other disk operating systems can be used, making a great deal of software available to Color Computer owners. Flex, from Technical Systems Consultants, is available now, with Microware Systems' OS-9 promised for later in the year.

Both assemblers and high level languages are available to run under these DOSes, which shouldn't hurt the popularity of the Color Computer one bit. These things don't come for free, though, so there should still be a market for other language packages running under Radio Shack's DOS.

When should one use assembly language? It is frequently claimed that assembly programs are blindingly fast, perhaps 100 times or so faster than Basic. That is not strictly correct. It is the machine language output that is fast. The object code produced by, say, a Fortran compiler, can really zip along too. Still, this points us in the right direction.

Where speed is important, such as in real-time handling of I/O or graphics, assembly language has a lot going for it. It helps if you can write fairly small routines, too. Very long programs can be difficult to debug. Assembly language generally results in "tight" object code, so it can be very useful when memory is at a premium. It is also easiest to use in situations where number-crunching — at least of the floating-point variety — can be kept to a minimum.

Now it is time to look at alternative high level languages. It also seems worthwhile to split up the tabulation: Table 2 for products which run on unmodified Color Computers, Table 3

Table 1. Color Computer Assemblers.

Name (and Vendor Code)	Minimum System	Form	Price	Remarks
Programmers Tool Kit (CW)	16K	ROM + Tape	$179.95	Includes monitor, editor, assembler, diagnostics, and RAM.
Color assembler (CW)	32K	Tape	29.95	
Color editor	32K	Tape	29.95	
Disk Macro Assembler (CW)	32K	Disk	49.95	Requires editor
CO-RES9 (CC)	16K	Tape	39.95	Co-resident editor and assembler
CCASM9 (CC)	4K	Disk	34.95	Requires vendor's CCMD+9 disk operating system ($159.95), and editor.
CCEAD (ES)	16K	Tape	6.95	Editor, assembler, debugger (written in Basic).
Flex Editor and Assembler (HL)	64K	Disk	150.00	Flex operating system plus the editor and assembler.
Assembler (HL)	64K	Disk	50.00	Require Flex.
Editor	64K	Disk	50.00	
OS-9 Interactive Assembler (HL)	64K	Disk	125.00	Require OS-9 operating system
OS-9 Text Editor	64K	Disk	125.00	
SPS80C (MW)	16K	ROM	89.95	Editor, assembler, monitor
Macro-80C (MW)	16K	Disk	99.95	Three utilities, as above.
EDTASM (SA)	16K	Tape	34.95	Editor and assembler.
EDTASM+ (RS)	16K	ROM	44.95	Editor, assembler and monitor

Table 2. High Level Languages for Unmodified Color Computers.

Name (and Vendor Code)	Minimum System	Form	Price	Remarks
Tiny Compiler Basic (AA)	16K	Disk or Tape	$ 24.95	
Color Pascal (CW)	32K	Tape	49.95	Includes supervisor, editor
(actually Dynasoft v1.2)	32K	Disk	59.95	Requires ASCII text editor
Small C Compiler (DG)	16K	Disk	59.95	Requires assembler package
Colorforth (AR)	16K	Tape	49.95	Cassette also contains program for use with disk systems
CCForth (HL)	—	Disk	99.95	
Colorforth (TM)	4K	ROM	110.00	Disk versions available

for those requiring one of the alternative DOSes.

Other Basics

Why would anyone want to invest in another Basic when such a good one comes with the Color Computer? Well, remember my recitation of the acknowledged sins of Basic: slow speed and incompatibility with the precepts of structured programming? Products which attack both are now available.

> ***Basic09 seems rich enough to keep anyone busy for quite a while.***

Conventional Basic is slow because it is an interpreted language; every instruction must be decoded anew each time it is encountered, even if this means decoding the same thing hundreds of times within a loop. Compiled languages with machine language object code are much faster, and so it would seem worthwhile to produce a compiler which accepts Basic syntax for the source code.

What you give up is, of course, the immediacy of the programmer-computer interaction which makes Basic programs fairly easy to debug and modify. There is always the intermediate step of source code compilation to contend with.

As you might guess from the price differentials, the three alternative Basics listed in Tables 2 and 3 differ considerably in capability. In addition, none preserves the advanced graphics features of Extended Color Basic.

Aardvark's Tiny Compiler for the Radio Shack DOS handles only a small subset of Basic commands, and restricts the labels which you can assign to variables. It produces relocatable object code; thus you can use it to compile several subroutines which can later be called from Extended Color Basic by the USRn command. The compiler itself is written in Extended Color Basic, and occupies about 7.2K of RAM. The documentation is very complete, comprising a complete listing and several pages of descriptive comments.

As far as the restrictions are concerned, I must admit that the Tiny Compiler took me back to my first encounter with Basic, nearly 15 years ago. The IBM version of those days (run from a Teletype machine) restricted one to a single arithmetic command per statement, as does the Tiny Compiler. Thus A=B+C+D becomes

```
10 A=B+C
20 A=A+D
```

This is clearly not the vehicle for extensive computation. What might it be good for, then? My applications have stressed fast sorting routines. Even for nested FOR...NEXT loops (up to nine levels of nesting are allowed) the object code of Tiny Compiler is 15-20 times faster than Basic; for a single loop, the speed advantage is close to 30 times.

There are numerous syntax restrictions, violations of which are claimed to account for most of the errors encountered upon compilation. For example, variable names are limited to a single letter; dimensioned variables A(n)...Z(n) may have subscripts ranging from 0 to 128, although if you use only one dimensioned variable in a routine its subscript may range up to 999.

Programs destined for compilation can first be run with the Basic inter-

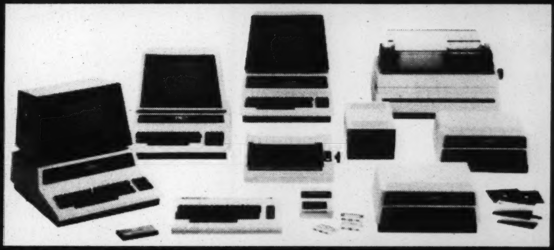
Table 3. High Level Languages for Alternative Operating Systems.

Name and Vendor Code	Price	Remarks
A/Basic (HL)	$150.00	Flex, OS-9 Versions Available
Basic09 (HL)	200.00	OS-9; from Microware
Dynasoft Pascal v1.3 (HL)	59.95	Flex; $89.95 with source code
Dynasoft Pascal v1.4 (HL)	69.95	OS-9; $99.95 with source code
OS-9 Pascal Compiler (HL)	400.00	From Microware; produces assembly language source code plus p-code
TSC Pascal (HL)	200.00	Flex; from Technical Systems Consultants
Omegasoft Pascal (OM)	425.00	Flex, OS-9 versions; assembly language output
C Compiler (MR)	400.00	OS-9; Unix version 7 language
C Compiler (WW)	52.50	Flex; upgrade program announced
DGS Flex C V2.0 (DG)	120.00	Flex; floating point math, etc.
DGS OS9 C V1.0 (DG)	95.00	OS-9
X-Forth (HL)	149.95	Flex
T-Forth (TM)	100.00	Flex, Extended Fig-Forth
T-Forth+ (TM)	250.00	as above, but enhanced
CIS Cobol Compiler (HL)	895.00	OS-9; ANSI 1974 Level 1 Standard

Table 4.
Vendors of Alternative Languages.

AA	Aardvark-80 2352 S. Commerce Walled Lake, MI 48088
AR	Armadillo International Software P.O. Box 7661 Austin, TX 78712
CC	Cer-Comp 5566 Ricochet Ave. Las Vegas, NV 89110
CW	Computerware P.O. Box 668 Encinitas, CA 92024
DG	Dugger's Growing Systems P.O. Box 305 Solana Beach, CA 92075
ES	Eigen Systems P.O. Box 10234 Austin, TX 78766
HL	Frank Hogg Laboratory 130 Midtown Plaza Syracuse, NY 13210
MR	Microware Systems Corp. 5835 Grand Ave. Des Moines, IA 50312
MW	Micro Works P.O. Box 1110 Del Mar, CA 92014
OM	Omegasoft Industrial Products Group P.O. Box 70265 Sunnyvale, CA 94086
RS	Radio Shack Tandy Center Ft. Worth, TX
SA	Spectral Associates 141 Harvard Ave. Tacoma, WA 98466
TM	Talbot Microsystems 1927 Curtis Ave. Redondo Beach, CA 90278
WW	Word's Worth P.O. Box 28954 Dallas, TX 75228

SJB DISTRIBUTORS. THE MOST COMPETITIVE PRICES ON COMMODORE PRODUCTS.



commodore

INTERFACES

ADA-1450 Serial	$149
ADA-1600 Parallel	149
RS232 cable for Vic or 64.6m	30
Video Audio cable for 64 & monitor	25

MONITORS — Great resolution for the CBM 64 or VIC

Panasonic. 16" Color	$360
Amdek Color I	360
Panasonic. 9" b&w	130

BUSINESS SOFTWARE

Spellmaster Dictionary (great for WordPro!)	$199
OZZ Data Base System (8050)	240
Silicon Office (database. wp)	995 (New)
Wordcraft 80	289
VisiCalc (new expanded)	199
Dow Jones Portfolio Management System (RS232)	120
WordPro 4 + or 5 +	299
The Manager	199
Galaxy One (games)	39
Legal Time Accounting	425
I.R.M.A.	295
BPI A.R. G.L. Job Cost. Inventory. Payroll	325 pkg

SJB carries many other lines of equipment and products. Call us for our new fall catalogue.

MasterCard, Visa, Money Order, Bank Check
COD (add $5) accepted.
Add 3% surcharge for credit cards.
In stock items shipped within 48 hours. F.O.B.. Dallas. TX.
All products shipped with manufacturer's warranty.

TO ORDER CALL TOLL FREE
800-527-4893 800-442-1048 (Within Texas)

SJB will meet any competitive price under similar in-stock conditions.

SJB DISTRIBUTORS, INC.
10520 Plano Road. Suite 206
Dallas. Texas 75238
(214) 343-1328

Prices are subject to change without notice.

SOFTWARE FOR CBM 64

Word Processing	$80
Computer Tutoring Game	50
CBM EasyCalc (for the 64)	call
CBM EasyFinance	call
CBM EasyPlot	call
CBM EasyScan (appointment manager)	call
RS232 Interface (modems, printers)	40

VIC PRODUCTS

VIC 20 Computer, 5K	$239
Vic Datasette Recorder	65
Vic 1540 Disk Drive	467
VIC MODEM (for CBM 64)	100
VIC 1515 Graphic Printer (for CBM 64)	325
8K Memory Expansion Cartridge	49
16K RAM	95
24K RAM	149
IEEE Interface	80

VIC Games

Gorf (great arcade game)	$39
Omega Race	39
Midnight Drive	23
Avenger	23
Super Alien	23
Poker	23
Superlander	23
Vic Super Expander	55
Vic Intro to Basic	21
Vic Cassette Recreation Pack	46
Vic Cassette Home Finance Pack	46

Arcade Joysticks — Red Ball with 2 firing buttons! Great for the VIC or 64	**$25**
SuperPET (5 languages. 2 processors)	$1409
CBM 8032 Computer. 80 column	1029
CBM Memory Expansion. 64K	359
PET 4032.40 Column	795
CBM 8050.1Mg. Dual Drive	1259
CBM 8250.2Mg. Dual Drive	1760
CBM D9060.5 Mg. Hard Disk	2795
CBM D9090.7.5 Mg. Hard Disk	3195
CBM 4040.340K Dual Drive	919
CBM 2031.170K Single Drive	489

PRINTERS — LETTER QUALITY

CBM 8300.40cps	$1450
Diablo 620.25cps	1350
Nec Spinwriter 7700.55cps	2350
Nec Spinwriter 3500.35cps	1600

PRINTERS — DOT MATRIX

CBM 4022.80cps graphics	$450
CBM 8023.150 cps graphics	699
Okidata 82A.120cps serial or par	449
Nec 8023A(parallel)	499

CIRCLE 271 ON READER SERVICE CARD

preter and debugged in the usual way. When the source code is "clean," the Tiny Compiler can be invoked to generate object code. At this point the user may specify a choice of loading address, or use the compiler default. When compilation is complete the new code can be saved or run immediately.

The Tiny Compiler provides an interesting, if specialized, tool for owners of stock Color Computers. Upgrading to Flex or OS-9 makes more versatile languages available. For example, A/Basic features comprehensive string-handling functions and is claimed to compile to very efficient machine code, while retaining familiar Basic source code syntax. It benefits from several years' worth of experience with a similar language which runs on 6800 systems.

Microware's Basic09 is a different sort of beast. It incorporates many structured programming concepts, and bears more than a superficial resemblance to Pascal. Like most versions of Pascal, Basic09 compiles not to machine language, but to a standardized intermediate language which is later run under its own interpreter. The general idea is that the interpreter for the intermediate version (called I-code for Basic09, P-code for Pascal) can be a relatively simple affair. The compiler which generates the intermediate code is fairly complex, but can be made to run on a variety of machines — i.e. it, and the source code, can be portable.

In practice, portability is often compromised to capitalize on particular features of a given computer.

In any case, we are concerned with one language for one machine, and Basic09 seems rich enough to keep anyone busy for quite a while. While much of its syntax resembles that of other Basics, it features a wealth of modular programming features.

For example, program modules called procedures replace subroutines. Procedures can call one another, by name, from libraries built by the individual user. The concept of data typing is emphasized; Besides integers and real (floating point) numbers and strings, Basic09 permits the programmer to define Boolean and byte variables, as well as arbitrary combinations of elementary types.

JOE
TONY
TRS-80

"Our home computer has become just like one of the family!"

With Pascal, as with the alternative Basic dialects, the color computer owner has options.

Basic09 supports new looping structures (WHILE—DO, REPEAT—UNTIL, and LOOP—ENDLOOP) in addition to FOR...NEXT. Coupled with the lack of line numbers and indented line format, these lend a definite Pascal-like look to Basic09 source code.

In addition to the I-code compiler and the run-time interpreter, the Basic09 package includes several features which speed the programming process. The source code editor is part of the compiler, for example, and the syntax of each source line is checked as it is entered. This means that "mechanical" errors can be found and corrected before time is wasted in attempting to compile an entire program. There is also a run-time debugger which helps in getting programs with more subtle logical flaws up and running properly.

Pascal

Basic09 may resemble Pascal, but don't think that is as close as the Color Computer can get. Several packages for the real thing are available for all Color Computer configurations.

Pascal is, of course, the very successful block-structured language developed in the late sixties by Professor Niklaus Wirth at the Swiss Federal Technical Institute. His stated purpose was to create a language suitable for teaching his concepts of disciplined, structured programming. He clearly succeeded.

Pascal has been widely implemented, and has influenced much subsequent work in the study of programming languages. It is not hard to learn, but don't be misled; to make the most effective use of Pascal, the average Basic programmer must change the way he approaches, and even thinks about, a programming task. This is well recognized, and several books specifically aimed at converting Basic programmers to Pascal have recently been published. Let me assume that you are sufficiently curious and motivated, then, and go on to discuss some of the software.

I was introduced to Pascal by Computerware's old, 16K-Plus-Power Pack version of Color Pascal, which has now been replaced by a pair of packages for 32K machines. I understand that the new cassette version resembles the one from which I learned. It includes a general control program called the Supervisor, together with an Editor and some monitor routines.

The Supervisor is used to control compilation and the loading and saving of both source and P-code programs. The disk system requires an external editor, capable of producing ASCII files, for source code preparation. It comprises a compiler and a run-time package which must be loaded separately at the appropriate times.

A copy of the source program should be made before attempting compilation, since this destroys the source — the only thing that can be edited if errors are found. It is also worthwhile to generate a printer listing of the compilation to keep track of errors, since there is no way to scroll back through a long screen listing. Error messages are generated as compilation proceeds. It is characteristic of Pascal that a syntax error early in a program may generate a large number of apparent errors later on, which magically disappear when the original offender is repaired.

I have gone on at some length about this to give you a feeling for the way you must be prepared to shuttle back and forth between programming tools (Editor, Supervisor, etc.) in a small system.

Of course, memory size imposes other restrictions. In the old version, at least, Color Pascal was a fairly limited subset of the language. It incorporated most of the standard control and decision structures (BEGIN—UNTIL, IF—THEN—ELSE, CASE, REPEAT—WHILE—UNTIL), but omitted some advanced data structures and floating-point arithmetic.

The 32K versions are somewhat more sophisticated in their handling of I/O, and the added memory lets the

NEW LOW-COST ENGINEERING/BUSINESS PLOTTER

AMDEK X-Y PLOTTER
PEN HOLDER
AMDEK
EXPANDABLE INTELLIGENT X-Y PLOTTER
AMDEK

Cost-effective "originals"

The Model DXY is an economical multi-pen, X-Y coordinate plotter that produces hard copy graphics in minutes for all types of business applications and technical disciplines. Priced at under $1000, it's compatible with the IBM, Apple and other personal computers. It has built-in software (expandable ROM) to interpret "Basic" commands. Just call, or write for complete specifications on the Model DXY Plotter. Ideal for end-user or OEM applications.

- 10" x 14" effective plotting range.
- Centronics interface for easy connection to your computer.
- Pens, penholders, chart hold-downs, and dust cover are included.
- Charts on popular graphics media including vellum and mylar.

2201 Lively Blvd. • Elk Grove Village, IL 60007
(312) 364-1180 TLX: 25-4786

AMDEK CORP.

Amdek . . . your guide to innovative computing!

CIRCLE 107 ON READER SERVICE CARD

Alternatives, continued...

user be more relaxed about having to write and store floating-point math packages and personalized library procedures.

Dynasoft, the Nova Scotia firm which produced the original Color Pascal, has also created much more potent versions which run under Flex and OS-9. These feature advanced file-handling capabilities, floating-point math, and so on. Microware's OS-9 Pascal Compiler can produce two forms of output: P-code, for execution in an interpretive mode, and 6809 assembly language. The latter can then be compiled and run in the usual way, for maximum speed.

This brings up a good point: Pascal itself is not exceptionally fast. Since most P-code is run as an interpreted language, it is not uncommon to see only modest speed improvements (three to five times) over Basic. Of course, the straightforward structure imposed by Pascal may result in additional improvements because of the elimination of convoluted program branches.

The Microware compiler also features a form of virtual memory management, permitting the user to run larger programs that might seem feasible for a 48K machine (remember, 48K is what is left when OS-9 or Flex is used with a 64K machine).

Omegasoft's single-pass compiler also features assembly language output. It is part of a rather complete system of programming tools, including a symbolic debugger, run-time library, and file-handling utilities.

With Pascal, as with the alternative Basic dialects, the Color Computer owner has options. You can get a fairly inexpensive package that allows you to try out another language on a stock computer, or you can take the plunge and modify your machine for one of the advanced operating systems.

The C Language

C is a structured high level language, developed at Bell Laboratories in the early seventies, which has received a great deal of attention as the Primary language of Bell's Unix operating system. Unix is probably most commonly used for text manipulation, but C should be thought of as a fairly compact, general purpose language. In its full implementations, it supports most of the data structures, control capabilities, and data typing which characterize modern thinking of language design. Once again, Color Computer people can choose among C packages of various prices and capabilities.

Although there is a certain family resemblance between the source code

ANNOUNCING...

80 Columns for the ATARI® 800

The **FULL-VIEW 80** Display Card combines the best of two worlds — 80-column capability with normal ATARI 40-column/graphics mode. 80-column mode provides upper and lower case characters with full descenders.

Add the **32K MEMORY PLUS** with the FULL-VIEW 80 to achieve a 48K, 80-column system. The 32K MEMORY PLUS card operates with both the ATARI 400 and ATARI 800

ATARI

The ATARI FULL-VIEW 80 and 32K MEMORY PLUS join the family of APPLE products currently available from BIT 3

FULL-VIEW 80–
80 x 24 display for the APPLE II and APPLE II PLUS supplies upper and lower case with full descenders, line drawing graphics, and shift key detector for typewriter-like operation.

APPLE®

DUAL-COMM PLUS
Two independent serial I/O ports for the APPLE II combines features of APPLE High Speed Serial Card and APPLE Communications Card in one card. Baud rates range from 50 to 19,200. Great with the FULL-VIEW 80 and a modem.

MEMORY PLUS–
16K addition to increase your 48K APPLE to 64K.

Contact your ATARI or APPLE dealer or BIT 3 for more information.

ATARI PRODUCTS:

Full-View 80	$349.00
32K Memory Plus	$179.00

APPLE PRODUCTS:

Full-View 80	$295.00
Dual-Comm Plus	$239.00
Memory Plus	$149.00

ATARI is a registered trademark of ATARI, Inc.; FULL-VIEW 80 and MEMORY PLUS are registered trademarks of BIT 3; APPLE II is a registered trademark of Apple Computer, Inc.

BIT 3
COMPUTER CORPORATION

8120 Penn Avenue South, Suite 548
Minneapolis, Minnesota 55431
(612) 881-6955

MasterCard
VISA

CIRCLE 123 ON READER SERVICE CARD

THE BEST GETS BETTER!

Available NOW!
ComboPlus with
Real-Time-Clock
as shown Model MR-128SP

Fully field upgradeable
64K-256K Parity Checked Memory
Parallel Printer Port (IBM compatible)
Real-Time-Clock (MS-DOS support standard, CPM/86 support available)
Async Com. Port (IBM compatible)

Other products available for IBM PC: 1) 2780/3780 Bisync Emulation package; 2) Advance Com. card - Async, Bisync, SDLC, HDLC; 3) Expansion parity memory - 64K-256K; 4) Disk++ (memory, Async & disk host adaptor; 5) Original Memory Combo; 6) Async Communication Card - (1 or 2 ports); 7) Wire Wrap Card (13.1″ X 4″); 8) Extender Card.
Ask for AST products at your local Computerland stores.

Ses us at Comdex, Nov 29-Dec 2, Booth 584 & 586.

AST
RESEARCH INC.
2691 Richter Ave., Suite 104, Irvine, CA 92714 (714) 540-1333

Dealer inquires welcome.

CIRCLE 114 ON READER SERVICE CARD

Let's get personal...

try out the in-stock selection of Heath/Zenith microcomputers, peripherals, accessories and software.

Now available at your nearby Heathkit Electronic Center, or through the Heathkit mail order catalog.

You get more with a Heath/Zenith personal microcomputer system! We offer:

1. Proven high-performance hardware: Thousands of our microcomputers prove themselves daily, in the field.

2. Vast software library: Three operating systems (including CP/M), languages, word processors, an electronic spreadsheet, versatile utilities and the 500-program Heath Users' Group software library.

3. Self-instruction courses: Evaluation and programming courses from Heathkit/Zenith Educational Systems.

4. Service support: Before and after the sale – consultation by phone, carry-in service by trained technicians.

Test run one of our microcomputers at any of the more than 60 convenient Heathkit Electronic Centers in the U.S.

Heathkit®
ELECTRONIC CENTERS*

See the white pages of your telephone book for store locations and telephone numbers.

*Units of Veritechnology Electronics Corporation in the U.S.

CP-211

listings of programs written in Pascal and those written in C, head-to-head comparisons between the two languages are not easy to make. For example, the two differ as to which features are included in the languages themselves and which must be provided by the programming environment.

The best-known example is input/output. The original specification of Pascal includes I/O considerations, but; in C, I/O chores are handled by standard library routines. (Even the least expensive C package for the Color Computer includes some really useful routines, however, capable of handling either single characters or fully formatted strings.)

In general, it is probably correct to say that Pascal is a relatively tightly-structured language designed to improve program reliability, while C has been made more "forgiving" to encourage a wider variety of applications. A recent review paper in the professional literature concluded that C is the better of the two languages for writing operating systems and system utilities, while Pascal is somewhat better suited for business programming.

Now let's look at what is available for the Color Computer. Small C Compiler, from Dugger's Growing Systems, for stock machines (16K or larger) requires an ASCII editor to create source code and an assembler to handle its own output. Assembled C programs can be called from Basic. The package lacks floating point math and some of the advanced data typing features of full-fledged C, but then it is still evolving — Dugger's promises future program enhancements, with maintenance by newsletter as warranted.

The manual is quite good, giving numerous illustrations of correct C syntax and pointing out the few substitutions necessary to handle the language with the limited character set of the Color Computer.

Dugger's Flex system, on the other hand, does include floating point and long (24-bit) numbers, as well as additional control features. The OS-9 version seems to be similar to the Small C Compiler, but adapted to the creation of program modules which can be linked, loaded, and run in the multi-tasking environment for which the operating system was created.

Microware's OS-9 version of C will be much more elaborate: a full implementation of the Unix Version 7 standard. It is not available as of this writing, but release is promised for the near future. The final entry, Flex9 from Word's Worth, is modestly priced and seems to offer a subset of the language. A specific program of upgrades through Versions 2.0 and 3.0 has been announced, although prices have not been set.

You can see, then, that the C situation is fairly fluid. Operators of each of the three Color Computer DOSes can obtain a limited-capability C, and Flex and OS-9 users, at least, can look forward to a much more capable system in the near future. That is probably not too bad a situation for this relatively new kid on the block.

Forth requires a fair degree of attention to detail on the part of the programmer.

Forth

Forth is very different in appearance and intent from Basic, Pascal, and C. It is a relatively small language of surprising power and great flexibility. Although most versions start with a well standardized set of dictionary entries (analogous to commands), the programmer is encouraged to expand the language to fit his needs.

Forth requires a fair degree of attention to detail on the part of the programmer — less than assembly language, but certainly more than the other high level languages I have been discussing. Its syntax can be rather involved, even comical.

My favorite example of a perfectly legitimate Forth statement (definition, actually) is

```
: ? @ . ;
```

Get the idea? Forth also has some of the most knowledgeable, enthusiastic, and opinionated adherents I have ever met — a characteristic it shares with APL, another language of considerable power and non-obvious syntax. A final characteristic of Forth is that its literature is full of awful titles: one Sets Forth, Goes Forth, Starts Forth, Ventures Forth, and so on.

What is the language all about? A few facts are easy to set down: Forth was invented by Charles Moore (who still heads a firm called Forth, Inc.), it has attracted quite a following among designers of computer-controlled instrumentation and machinery, and it can be used to support most computer applications. Forth experts will tell you that it isn't just a language, but a complete environment — an integrated set of programming tools.

Programming in Forth has its own flavor. You begin with a relatively standardized dictionary of approximately 150 high-level words. These are actually calls to lower-level subroutines, which may themselves contain additional calls.

Eventually the chain terminates with machine language code. However, the programmer is usually concerned with building up, away from the primitive definitions. The process is one of using the dictionary to define additional words which perform part of the task at hand. The last word defined is usually of such scope that when called, it executes the entire program. Some or all of the words defined in the programming process may be added to the dictionary for future use. I will later give some examples of interest to Color Computer users.

Forth is called a "threaded interpretive language," because of the "thread" of subroutine addresses leading from final definition down to machine code. To confuse matters a bit, though, there are both interpreter and compiler aspects to the language.

It relies heavily on manipulation of the parameter stack (a portion of RAM in which data are stored in last-in, first-out fashion) to pass operands and data from one word to another. Variables and constants can also be named, however, just as in other high level languages.

The user is responsible for keeping careful track of where items are on the stack. The explicit use of the stack also makes it reasonable for Forth to employ Reverse Polish Notation, in which mathematical or logical operations follow the operands to which they apply. The whole scheme is one which will be familiar to users of Hewlett-Packard Pocket calculators.

For an elementary example, here is how one might define a new word, CLEAR, to clear the CRT screen to a blank green field — just like the CLS command in the Color Basics. The definition will employ FILL, a word in the stock dictionary.

In accordance with Forth rules, the definition is begun with a colon and ends with a semicolon.

```
: CLEAR 1024 512 143 FILL ;
```

According to the syntax established for FILL, this instructs the computer to begin at address 1024 and load the next 512 locations with what Color Basic would call CHR$(13), a solid green block. Color Computer owners will, I hope, recognize 1024 as the address of the upper left corner of the low-resolution screen. Once CLEAR has been entered, it may be called by name from any Forth program.

Forth makes it easy to gain control over such things as I/O, for which the Color Computer requires the setting of specific bits in the data at particular locations. This is the technique used to control the A/D converter and the sound generator, for instance.

At the same time, the language possesses a fair complement of control and decision structures, such as DO loops and IF — THEN and BEGIN — UNTIL constructs. Some versions have fairly extensive facilities for handling strings, as well. In other cases these must be defined by the user and added to a customized dictionary.

The nature of Forth is such that a 16K or 32K computer can support a fairly powerful version — its extensible nature helps a great deal, of course. Even the inexpensive Colorforth package from Armadillo Software gives you a generous slice to work with. Its main deficiencies seem to lie in the manipulation of double-length (32-bit) integers, a fairly standard feature of other Forths, and strings.

What one gains with the more elaborate packages seems to be enhanced text-handling capability and a more elaborate set of editing and compilation tools, plus of course the ability to write larger programs.

Cobol

I came to computing by the scientific computation route (Fortran and all that), and was taught that Cobol was a big, wordy, clumsy language. The fact that it has been for many years the most widely-known of all high level languages wasn't supposed to count, I guess. Anyway, it, too, is available.

I want people to take the machine seriously.

CIS Cobol Compiler from Microware is a 6809 version said to be compatible with CP/M applications software and the ANSI 1974 Level One Standard. It carries a pretty stiff price, but may just make it possible to put together a Color Computer based system capable of handling the computing chores for a small business in a professional fashion. For applications like this, the total system price should be fairly attractive.

Final Thoughts

In this review, I have tried to present as complete a picture as possible of the alternatives to Color Basic. I hope that you don't conclude from this that I am anti-Radio Shack or anti-Microsoft. On the contrary, I think that the Color Computer represents a remarkable value, and I enjoy using Extended Color Basic for much of my own work.

I want people to take the machine seriously, however, and I think it is worthwhile to spread the word about products and tools which enhance its capabilities. Many of the language packages discussed here fall into this category.

To be sure, some of the material for the stock machine cannot do much more than whet the appetite for a more elaborate version of a given language. That tends to be the result of limited memory size, although some of these products may also have suffered from an author's haste to get to the marketplace.

In any event, the availability of the Flex and OS-9 operating systems, with the concomitant expansion of user RAM to 48K, certainly opens the way for even more powerful and flexible software for the Color Computer. ☐

INTRODUCING WATSON™

NOW THE INSPECTOR HAS AN ASSISTANT™

Teamed up inside your Apple,™ Watson adds new features that give you complete access to everything you ever wanted to know about memory and disks. Recover blown disks, fix catalog entries, display and delete control characters, repair bad data files even on disks with non-normal DOS. Search forward and backwards in memory, edit in HEX, ASCII, NEGATIVE ASCII and LOWER CASE. Scan disks forward and backwards, follow files forward and backwards in track/sector list on either 13- or 16-sector disks. Lockout sectors on Track Bit Map, reconstruct VTOC, find and display all Track/Sector Lists, display map of Sectors used on disk, read Nibbles track-by-track, Disassemble with ASCII displayed, kill inverse and flashing characters, verify and compare disks and display differences, read and write directly to disks. Alter DOS to display control characters in inverse, and dump the screen to a printer with a CTRL-Z, even from within BASIC. There's more but we're running out of space. Oh well, you get the idea.

Eprom or disk versions are always at your fingertips. Watson (requires The Inspector), $49.95. The Inspector, $59.95. At your local dealer or direct. MasterCard and Visa holders order toll-free, or return the coupon.

1-800-835-2246

OMEGA MICROWARE, INC.™

222 So. Riverside Plaza
Chicago, IL 60606
312-648-4844

Send me
☐ The Inspector @ $59.95
☐ Watson @ $49.95
Check or money order enclosed.
System description:
Apple II ☐ Apple II + ☐ Integer Card ☐ 16K Ram Card ☐

name ________
address ________
city ________
state, zip ________

© 1982 Omega MicroWare, Inc.
Apple is a registered trademark of Apple Computer, Inc.

CIRCLE 235 ON READER SERVICE CARD

Printer & Disk Drive Sale

Dot Matrix Printers

NEW EPSONS with GRAFTRAX-plus

Epson has improved and upgraded their best selling line of printers to include their new GRAFTRAX-plus graphics package. Features now include: 9 x 9 matrix, bi-directional/logic seeking, line spacing to n/216, programmable forms length and horizontal tabs, skip over perf, italics fonts, international symbols, superscript/subscript, normal, emphasized, double-strike, and double-emphasized print, underlining, line drawing graphics, 60/120 DPI bit image, software reset, adjustable right margin, and true back space.

MX-80 with GRAFTRAX-plus *80/132 column, 80 CPS, adjustable pin feed, parallel interface.*

PRM-28080	*MX-80 w/GRAFTRAX-plus*	**$479.95**

MX-80FT with GRAFTRAX-plus *same as MX-80 with friction feed and pin feed.*

PRM-28082	*MX-80FT w/GRAFTRAX-plus*	**$559.95**

MX-100 with GRAFTRAX-plus *132/232 column, correspondence quality, up to 15" paper, friction feed & adjustable pin feed, 18 x 18 dot matrix, 80 CPS.*

PRM-28100	*MX-100 w/GRAFTRAX-plus*	**$754.95**

PRA-27084	*Serial interface*	**$54.95**
PRA-27088	*Serial intf & 2K buffer*	**$99.95**
PRA-27081	*Apple card*	**$39.95**
PRA-27082	*Apple cable*	**$19.95**
PRA-27086	*IEEE 488 card*	**$59.95**
PRA-27087	*TRS-80 cable*	**$24.95**
PRA-27097	*GRAFTRAX-plus MX-80, FT*	**$59.95**
PRA-27197	*GRAFTRAX-plus MX-100*	**$64.95**
PRA-27090	*MX-80, FT print head*	**$44.95**
PRA-27190	*MX-100 print head*	**$49.95**
PRA-27083	*MX-80 ribbon cart.*	**$13.95**
PRA-27101	*MX-100 ribbon only*	**$9.95**

BETTER THAN EPSON ! - Okidata

Microline 82A *80/132 column,* ***120 CPS****, 9 x 9 dot matrix, friction feed, pin feed, adjustable tractor feed (optional), handles 4 part forms up to 9.5" wide, rear & bottom feed, paper tear bar, 100% duty cycle/200,000,000 character print head, bi-directional/logic seeking,* ***both serial & parallel interfaces included****, front panel switch & program control of 10 different form lengths, uses inexpensive spool type ribbons, double width & condensed characters, true lower case descenders & graphics*

PRM-43082	*Friction & pin feed*	**$499.95**

Microline 83A *132/232 column, 120 CPS, forms up to 15" wide, removable tractor, plus all the features of the 82A.*

PRM-43083	*with FREE tractor*	**$744.95**

Microline 84 *132/232 column, Hi-speed 200 CPS, full dot graphics built in, plus all the features of the 83A.*

PRM-43084	*Centronics parallel*	**$1149.95**
PRM-43085	*Serial with 2K buffer*	**$1249.95**
PRA-27081	*Apple card*	**$39.95**
PRA-27082	*Apple cable*	**$19.95**
PRA-27087	*TRS-80 cable*	**$24.95**
PRA-43081	*2K hi speed serial card*	**$99.95**
PRA-43082	*Hi-res graphics ROMs 82A*	**$49.95**
PRA-43083	*Hi-graphics ROMs 83A*	**$49.95**
PRA-43088	*Tractor option for 82A*	**$49.95**
PRA-43080	*Extra ribbons pkg. of 2*	**$9.95**

8023 DOT MATRIX - NEC

100 CPS, proportional spacing, hi-resolution graphics, correspondence quality printing, bi-directional tractor & friction feed.

NEC-8023A	*8023 parallel*	**$499.95**
NEC-8023-01	*8023 ribbon*	**$11.95**

PRINTER PALS - F.M.J. Inc.

Desk top printer stand and continuous form paper holder.

PRA-99080	*for MX-80, MX-80FT, Oki 82A, NEC*	**$29.95**
PRA-99100	*for MX-100, Oki 83A & 84*	**$34.95**
PRA-99700	*for letter quality printers*	**$49.95**

Jade Bus Probe

THE BUS PROBE - Jade

Inexpensive S-100 Diagnostic Analyzer

Double-high S-100 board which displays all 96 IEEE S-100 signals without the expense of an ocilliscope or a front panel

TSX-200B	*Bare board*	**$59.95**
TSX-200K	*Kit*	**$119.95**
TSX-200A	*A&T*	**$149.95**

Dual Disk Sub-Systems

Disk Sub-Systems - Jade

Handsome metal cabinet with proportionally balanced air flow system, rugged dual drive power supply, power cable kit, power switch, line cord, fuse holder, cooling fan, never-mar rubber feet, all necessary hardware to mount 2-8" disk drives, power supply, and fan, does not include signal cable.

Dual 8" Sub-Assembly Cabinet

END-000420	*Bare cabinet*	**$59.95**
END-000421	*Cabinet kit*	**$225.00**
END-000431	*A & T*	**$359.95**

8" Sub-Systems - Single Sided, Double Density

END-000423	*Kit w/2 FD100-8Ds*	**$975.00**
END-000424	*A & T w/2 FD100-8Ds*	**$1175.00**
END-000433	*Kit w/2 SA-801Rs*	**$999.95**
END-000434	*A & T w/2 SA-801Rs*	**$1195.00**

8" Sub-Systems - Double Sided, Double Density

END-000426	*Kit w/2 DT-8s*	**$1224.95**
END-000427	*A & T w/2 DT-8s*	**$1424.95**
END-000436	*Kit w/2 SA-851Rs*	**$1274.95**
END-000437	*A & T w/2 SA-851Rs*	**$1474.95**

5¼" Disk Drives

Tandon TM100-1 *single-sided double-density 48 TPI*

MSM-551001 $248.95 ea 2 for **$219.95 ea**

Shugart SA400L *single-sided double-density 40 track*

MSM-104000 $234.95 ea 2 for **$224.95 ea**

Shugart SA455 *half-size double-sided 48 TPI*

MSM-104550 $349.95 ea 2 for **$329.95 ea**

Shugart SA465 *half-size doule-sided 96 TPI*

MSM-104650 $399.95 ea 2 for **$379.95 ea**

Tandon TM100-2 *double-sided double-density 48 TPI*

MSM-551002 $324.95 ea 2 for **$298.95 ea**

Shugart SA450 *double-sided double-density 35 track*

MSM-104500 $349.95 ea 2 for **$329.95 ea**

Tandon TM100-3 *single-sided double-density 96 TPI*

MSM-551003 $324.95 ea 2 for **$298.95 ea**

Tandon TM100-4 *double-sided double-density 96 TPI*

MSM-551004 $448.95 ea 2 for **$419.95 ea**

MPI B-51 *single-sided double-density 40 track*

MSM-155100 $234.95 ea 2 for **$224.95 ea**

MPI B-52 *double-sided double-density 40 track*

MSM-155200 $344.95 ea 2 for **$334.95 ea**

MPI B-91 *single-sided double-density 77 track*

MSM-155300 $369.95 ea 2 for **$359.95 ea**

MPI B-92 *double-sided double-density 77 track*

MSM-155400 $469.95 ea 2 for **$459.95 ea**

5¼" Cabinets with Power Supply

END-000216	*Single cab w/power supply*	**$69.95**
END-000226	*Dual cab w/power supply*	**$94.95**

8" Disk Drives

Shugart SA810 *half-size single-sided double-density*

MSF-108100 $424.95 ea 2 for **$394.95 ea**

Shugart SA860 *half-size double-sided double-density*

MSF-108600 $574.95 ea 2 for **$549.95 ea**

Shugart SA801R *single-sided double-density*

MSF-10801R $394.95 ea 2 for **$389.95 ea**

Shugart SA851R *double-sided double-density*

MSF-10851R $554.95 ea 2 for **$529.95 ea**

Tandon TM848-1 *single-sided double-den thin-line*

MSF-558481 $424.95 ea 2 for **$394.95 ea**

Tandon TM848-2 *double-sided double-den thin-line*

MSF-558482 $574.95 ea 2 for **$549.95 ea**

Qume DT-8 *double-sided double-density*

MSF-750080 $524.95 ea 2 for **$498.95 ea**

Mitsubishi M2894-63 *double-sided double-density*

MSF-289463 $549.95 ea 2 for **$524.95 ea**

Siemens FDD 100-8 *single-sided double-density*

MSF-201120 $334.95 ea 2 for **$349.95 ea**

Prices may be slightly higher at our retail locations. Please contact the store in your area for exact pricing.

Hard Disk Drives

12 MEGABYTE SUB-SYSTEM - DayStar

12 Megabyte Winchester sub-system for most CP/M based microcomputers including Apple II, S-100, IBM PC, NEC, Xerox, TRS-80 II, Heath H-89, and others. Sub-system includes interface, controller, cabinet, power supply, CP/M software patch, & cables - ready to just plug in and run. A 1 Megabyte back-up drive is also available.

MSH-531010	*S-100 sub-system*	**$2095.00**
MSH-531020	*Apple II sub-system*	**$2095.00**
MSH-531030	*NEC sub-system*	**$2095.00**
MSH-531040	*Xerox sub-system*	**$2095.00**
MSH-531050	*TRS-80 II sub-system*	**$2095.00**
MSH-531060	*IBM PC sub-system*	**$2095.00**
MSH-531099	*1 Megabyte back-up*	**$699.95**

12 MEGABYTE WINCHESTER - Tandon

5¼" hard disk drive for hi-speed mass storage.

MSH-550603	*Bare 5¼" drive*	**$1094.95**

Letter Quality Printers

TP-1 LETTER QUALITY - SCM

10 CPS daisy wheel printer from Smith Corona.

PRD-45101	*Centronics parallel*	**$699.95**
PRD-45102	*Rs-232C serial*	**$749.95**

LETTER QUALITY PRINTER - Jade

Uses standard daisy wheels and ribbon cartridges, 16 CPS bi-directional printing, semi-automatic paper loader (single sheet or fan fold), 10/12/15 pitch, up to 16" paper, built-in noise suppression cover.

PRD-11001	*Centronics parallel*	**$959.95**
PRD-11002	*RS-232C serial model*	**$999.95**

STARWRITER F-10 - C. Itoh

New 40 CPS daisy wheel printer with full 15" carriage, uses standard Diablo print wheels and ribbons, both parallel and serial interfaces included.

PRD-22010	*Starwriter F-10*	**$1495.95**

80 CPS LETTER QUALITY - Fujitsu

High speed daisy wheel printer with both RS-232C serial & Centronics parallel interfaces, emulates NEC 5510, Diablo 630, Qume, and will interface to the IBM Personal Computer, features include Z-80 CPU, 16K buffer (48K optional), bi-directional printing, & baud rates up to 19.2K

PRD-86100	*Fujitsu with 16K*	**$2895.00**
PRD-86200	*Fujitsu with 48K*	**$3195.00**
PRA-86000	*Adjustable tractor*	**$190.00**

Software

PLANNER CALC - Target Software

Spread sheet (what if ?) program designed with the user in mind, user oriented (simple english) commands allow you to quickly master this powerful software package, supplied on disk for most CP/M based systems.

SFA-12251052M	*Apple II 5¼" CP/M*	**$49.95**
SFC-12251050F	*SS SD 8" CP/M*	**$49.95**
SFC-12251053F	*Xerox 8" CP/M*	**$49.95**
SFC-12251053M	*Xerox 5¼" CP/M*	**$49.95**
SFX-12251051M	*NEC 5¼" CP/M*	**$49.95**

PAC MAN - Atari

Atari's best selling game for your 800 or 400 computer.

SFI-31254022E	*Pac Man cartridge*	**$37.95**

Place Orders Toll Free

Continental U.S. **800-421-5500**

Inside California **800-262-1710**

For Technical Inquires or Customer Service call

213-973-7707

JADE

Computer Products

4901 W. Rosecrans, Hawthorne, Ca 90250

TERMS of SALE: Cash, checks, credit cards, or Purchase Orders from qualified firms and institutions. **Minimum Order $15.00.** California residents add 6% tax. Minimum shipping & handling charge $3.00. **Pricing & availibility subject to change**

CIRCLE 194 ON READER SERVICE CARD

Disk Drive for Apple $319.95

Diskettes

PREMIUM DISKETTES - Jade

We proudly put our name on these high quality diskettes -

5¼" Diskettes, Box of Ten

MMD-5110103	*SS, SD, 01S*	**$29.00**
MMD-5111003	*SS, SD, 10S*	**$29.00**
MMD-5111603	*SS, SD, 16S*	**$29.00**
MMD-5120103	*SS, DD, 01S*	**$31.00**
MMD-5121003	*SS, DD, 010*	**$31.00**
MMD-5121603	*SS, DD, 16S*	**$31.00**

8" Diskettes, Box of Ten

MMD-8110103	*SS, SD, 01S*	**$31.00**
MMD-8120103	*SS, DD, 01S*	**$39.00**
MMD-8220103	*DS, DD, 01S*	**$48.00**

BARGAIN DISKETTES

MMD-5110105	*5¼" SS, DD, 01S*	**$19.95**
MMD-5220105	*5¼" DS, DD, 01S*	**$32.95**
MMD-8110105	*8" SS, SD, 01S*	**$24.95**
MMD-8120105	*8" SS, DD, 01S*	**$32.95**
MMD-8220105	*8" SS, DD, 01S*	**$35.95**

Video Monitors

HI-RES 12" GREEN - Zenith

15 MHz bandwith 700 lines/inch, P31 green phosphor, switchable 40 or 80 columns, small, light-weight & portable.

VDM-201201	*List price $189.95*	**$129.95**

12" GREEN SCREEN - NEC

20 MHz bandwidth, P31 phosphor ultra-high resolution video monitor with audio.

VDM-561200	*List price $289.95*	**$199.95**

12" COLOR MONITOR - NEC

High resolution color monitor with audio.

VDC-651212	*Color monitor*	**$389.95**
NEC-1202D	*RGB color monitor*	**$999.95**

13" COLOR MONITORS - BMC

18 MHz RGB & composite video color monitors.

VDC-421320	*13" RGB Color*	**$329.95**
VDC-421310	*13" Composite video*	**$299.95**
VDX-420090	*RGB card for Apple*	**$149.95**

COLOR MONITORS - Amdek

Reasonably priced color video monitors.

VDC-80130	*13" Color I*	**$379.95**
VDC-801320	*13" Color II*	**$894.95**
IOV-2300A	*DVM board for Apple*	**$199.95**

AMBER or GREEN MONITORS - Jade

High resolution 18 MHz compact video monitors.

VDM-751210	*12" Amber phosphor*	**$149.95**
VDM-751220	*12" Green phosphor*	**$139.95**
VDM-750910	*9" Amber phosphor*	**$149.95**
VDM-750920	*9" Green phosphor*	**$139.95**

Modems

SIGNALMAN - Anchor

Direct-connect automatic answer/originate selection, 300 Baud full duplex, Bell 103, includes RS-232 cable

IOM-5600A	*Signalman*	**$98.50**

SMARTMODEM - Hayes

Sophisticated direct-connect auto-answer/auto-dial modem, touch-tone or pulse dialing, RS-232C interface, programmable

IOM-5400A	*Smartmodem*	**$248.95**
IOK-1500A	*Hayes Chronograph*	**$218.95**
IOM-2010A	*Micromodem II*	**$328.95**
IOM-1100A	*Micromodem 100*	**$368.95**

EPROM Erasers

ULTRA-VIOLET EPROM ERASERS

Inexpensive erasers for industry or home.

XME-3100A	*Spectronics w/o timer*	**$69.50**
XME-3101A	*Spectronics with timer*	**$94.50**
XME-3200A	*Economy model*	**$39.95**

Single User System

THREE BOARD SET - SD Systems

4 MHz Z-80A CPU, 64K RAM (optional 256K), serial I/O port, parallel I/O port, double density disk controller, CP/M 2.2 & manual set, system monitor, control & diagnostic software. Includes SBC-200, 64K ExpandoRAM II, Versafloppy II, & CP/M 2.2 - all boards are assembled & tested.

Board set with 64K of RAM	**$1095.00**
Board set with 256K of RAM	**$1295.00**

Apple II Accessories

16K RAM CARD - for Apple II

Expand your Apple to 64K, 1 year warranty

MEX-16700A	*Save $125.00 !!!*	**$69.95**

ADD-ON DISK DRIVE - for Apple II

Inexpensive direct replacement for Apple Disk II, works with Apple II controller as first or second drive.

MSM-123200	*Add On Drive*	**$319.95**
MSM-123100	*Controller*	**$94.95**

Z-80 CPU CARD - for Apple II

Two computers in one, Z-80 & 6502, more than doubles the power and potential of your Apple, includes Z-80 CPU card CP/M and complete manual set.

CPX-62800A	*A & T with software*	**$249.95**

8" DISK CONTROLLER - Vista

New from Vista Computer, single or double sided, single or double density, compatible with DOS 3.2/3.3, Pascal, & CP/M 2.2, Shugart & Qume compatible

IOD-2700A	*A & T*	**$499.95**

2 MEGABYTES for Apple II

Complete package includes: Two 8" double-density disk drives, Vista double-density 8" disk controller, cabinet, power supply, & cables, DOS 3.2/3.3, CP/M 2.2, & Pascal compatible.

1 MegaByte Package	*Kit*	**$1495.00**
1 MegaByte Package	*A & T*	**$1695.00**
2 MegaByte Package	*Kit*	**$1795.00**
2 MegaByte Package	*A & T*	**$1995.95**

APPLE-CAT - Novation

Software selectable 1200 or 300 baud, direct connect, auto-answer/auto-dial, auxiliary 3-wire RS232C serial port for printer.

IOM-5232A	*Save $50.00!!!*	**$325.95**

VISION 80 - Vista Computer

80 column x 24 line video card for Apple II, 128 ASCII characters, upper and lower case, 9 x 10 dot matrix with 3 dot descenders, standard data media terminal control codes, CP/M Pascal & Fortran compatible, 50/60 Hz

IOV-2400A	*Vista Vision 80*	**$299.95**

CPS MULTICARD - Mtn. Computer

Three cards in one! Real time clock/calendar, serial interface, & parallel interface - all on one card.

IOX-2300A	*A & T*	**$179.95**

HI-RES GRAPHICS CARD - Genie

Intelligent printer interface and control card allows full high resolution graphics and screen dumps.

IOP-2405A	*Genie for Epson*	**$119.95**
IOP-2410A	*Genie for Okidata*	**$119.95**
IOP-2415A	*Genie for NEC/C. Itoh*	**$119.95**

Power Strips

ISOBAR - GSC

Isolates & protects your valuable equipment from high voltage spikes & AC line noise, inductive isolated ground, 15 amp circuit breaker, U.L. listed

EME-115103	*3 socket*	**$39.50**
EME-115105	*4 socket*	**$49.50**
EME-115100	*8 socket*	**$54.50**
EME-115110	*9 socket rackmount*	**$74.50**

Single Board Computer

SUPERQUAD - Adv. Micro Digital

Single board, standard size S-100 computer system, 4 MHz Z-80A, single or double density disk controller for 5¼" or 8" drives, 64K RAM, extended addressing, up to 4K of EPROM, 2 serial & 2 parallel I/O ports, real time interrupt clock, CP/M compatible.

CPC-30800A	*A & T*	**$724.95**
IOX-4232A	*Serial I/O adapter*	**$29.95**

Z-80 STARTER KIT - SD Systems

Complete Z-80 microcomputer with RAM, ROM, I/O, keyboard, display, kludge area, manual, & workbook.

CPS-30100K	*Kit with workbook*	**$299.95**
CPS-30100A	*A & T with workbook*	**$469.95**

AIM-65 - Rockwell International

Complete 6502 microcomputer with alphanumeric display printer, keyboard, & instruction manual.

CPK-50165A	*1K AIM-65*	**$424.95**
CPK-50465A	*4K AIM-65*	**$474.95**
SFK-74600008E	*8K Basic ROM*	**$64.95**
SFK-64600004E	*4K assembler ROM*	**$43.95**
SFK-74600020E	*PL/65 ROM*	**$84.95**
SFK-74600010E	*Forth ROM*	**$64.95**
SFK-74600030E	*Instant Pascal*	**$99.95**
PSX-030A	*Power supply*	**$64.95**
ENX-000002	*Enclosure*	**$54.95**

SPECIAL PACKAGE

4K AIM-65, 8K Basic, power supply, & enclosure

Special Package Price	**$649.95**

S-100 EPROM Boards

PROM-100 - SD Systems

2708, 2716, 2732 EPROM programmer with software.

MEM-99520K	*Kit with software*	**$189.95**
MEM-99520A	*A & T with software*	**$249.95**

PB-1 - SSM Microcomputer

2708, 2716 EPROM board with on-board programmer.

MEM-99510K	*Kit with manual*	**$154.95**
MEM-99510A	*A & T with manual*	**$219.95**

EPROM BOARD - Jade

16K or 32K uses 2708 or 2716 EPROMs, 1K boundary.

MEM-16230K	*Kit w/o EPROMs*	**$79.95**
MEM-16230A	*A & T w/o EPROMs*	**$119.95**

S-100 Video Boards

SPECTRUM COLOR - CompuPro

Full-function color graphics board, up to 8 colors, 256 x 192 graphics, parallel I/O port, 8K RAM.

IOV-1870A	*A & T*	**$348.95**
IOV-1870C	*CSC*	**$398.95**

MICROANGELO - Scion

Ultra-high-resolution 512 x 480, 256 color or black & white S-100 video board

IOV-1500A	*A & T*	**$999.95**

S-100 MotherBoards

ISO-BUS - Jade

Silent, simple, and on sale - a better motherboard

6 Slot (5¼" x 8⅝")

MBS-061B	*Bare board*	**$19.95**
MBS-061K	*Kit*	**$39.95**
MBS-061A	*A & T*	**$59.95**

12 Slot (9¾" x 8⅝")

MBS-121B	*Bare board*	**$29.95**
MBS-121K	*Kit*	**$69.95**
MBS-121A	*A & T*	**$99.95**

18 Slot (14½" x 8⅝")

MBS-181B	*Bare board*	**$49.95**
MBS-181K	*Kit*	**$99.95**
MBS-181A	*A & T*	**$139.95**

ACTIVE TERMINATOR - CompuPro

A true mother's helper.

TSX-100A	*A & T*	**$59.45**

Prices may be slightly higher at our retail locations. Please call the store nearest you for local price and availability.

CompuPro Boards on Sale

S-100 CPU Boards

8086/8087 - CompuPro

16 bit. 8 or 10 MHz 8086 CPU with provisions for 8087 & 80130.

CPU-70520A	*8 MHz 8086 A & T*	**$624.95**
CPU-70520C	*8 MHz 8086 CSC*	**$764.95**
CPU-70530A	*with 8087 A & T*	**$1224.95**
CPU-70530C	*with 8087 CSC*	**$1455.95**

8085/8086 - CompuPro

Both 8 & 16 bit CPUs. standard 8 bit S-100 bus. up to 8 MHz. accesses 16 Megabytes of memory.

CPU-20510A	*6 MHz A & T*	**$398.95**
CPU-20510C	*6 8 MHz CSC*	**$497.95**

CPU-Z - CompuPro

2 4 MHz Z80A CPU. 24 bit addressing.

CPU-30500A	*2 4 MHz A & T*	**$279.95**
CPU-30500C	*3 6 MHz CSC*	**$374.95**

SBC-200 - SD Systems

4 MHz Z-80A CPU with serial & parallel I O. 1K RAM. 8K ROM space. monitor PROM included.

CPC-30200A	*A & T*	**$399.95**

THE BIG Z - Jade

2 or 4 MHz switchable Z-80 CPU board with serial I O. accomodates 2708. 2716. or 2732 EPROM. baud rates from 75 to 9600.

CPU-30201B	*Bare board w manual*	**$35.00**
CPU-30201K	*Kit with manual*	**$149.95**
CPU-30210A	*A & T with manual*	**$199.95**

CB-2 - SSM Microcomputer

2 or 4 MHz Z-80 CPU board with provision for up to 8K of ROM or 4K of RAM on board. extended addressing. IEEE S-100. front panel compatible.

CPU-30300K	*Kit with manual*	**$229.95**
CPU-30300A	*A & T with manual*	**$274.95**

2810 Z-80 CPU - C.C.S.

2 or 4 MHZ Z-80 CPU with serial I O port & on-board monitor PROM. front panel compatible.

CPU-30400A	*A & T with PROM*	**$289.95**

2820 Z-80 DMA CPU - C.C.S.

4 MHz Z-80 CPU board with 2 serial I O ports & Centronics parallel I O port. separate data & status ports. DMA daisy chain compatible.

CPU-30420A	*A & T with manual*	**$569.95**

S-100 Disk Controllers

DISK 1 - CompuPro

8" or 5¼" DMA disk controller. single or double density. single or double sided. 10 MHz.

IOD-1810A	*A & T*	**$449.95**
IOD-1810C	*CSC*	**$554.95**
SFC-52506580F	*8" CP M 2 2 for Z-80*	**$174.95**
SFC-52506586F	*8" CP M 2 2 for 8086*	**$299.95**
SFO-54158000F	*Oasis single user*	**$499.95**
SFO-54158002F	*Oasis multi-user*	**$849.95**

VERSAFLOPPY II - SD Systems

Double density disk controller for any combination of 5¼" and 8" single or double sided. analog phase-locked loop data separator. vectored interrupts. CP M 2 2 & Oasis compatible. control diagnostic software PROM included.

IOD-1160A	*A & T with PROM*	**$359.95**
SFC-55009047F	*CP M 2 2 with VF II*	**$99.95**

2242 DISK CONTROLLER - C.C.S.

5¼" or 8" double density disk controller with on-board boot loader ROM. free CP M 2 2 & manual set.

IOD-1300A	*A & T with CP M 2 2*	**$399.95**

DOUBLE D - Jade

High reliablity double density disk controller with on-board Z-80A. auxiliary printer port. IEEE S-100. can function in multi-user interrupt driven bus.

IOD-1200B	*Bare board & hdwr man*	**$59.95**
IOD-1200K	*Kit w hdwr & sftwr man*	**$299.95**
IOD-1200A	*A & T w hdwr & sftwr man*	**$359.95**
SFC-59002001F	*CP M 2.2 with Double D*	**$99.95**

S-100 Memory Boards

256K RAMDISK - SD Systems

ExpandoRAM III expandable from 64K to 256K using 64K x 1 RAM chips. compatible with CP M. MP M. Oasis. Cromemco. & most other Z-80 based systems. functions as ultra-high speed disk drive when used with optional RAMDISK software.

MEM-65064A	*64K A & T*	**$474.95**
MEM-65128A	*128K A & T*	**$574.95**
MEM-65192A	*192K A & T*	**$674.95**
MEM-65256A	*256K A & T*	**$774.95**
SFC-55009000F	*RAMDISK sftwr CP M 2 2*	**$44.95**
SFC-55009000F	*RAMDISK with EXRAM III*	**$24.95**

128K RAM 21 - CompuPro

128K x 8 bit or 64K x 16 bit static RAM board. 12 MHz. 24 bit addressing.

MEM-12810A	*A & T*	**$1609.95**
MEM-12810C	*CSC*	**$1794.95**

64K RAM 17 - CompuPro

64K CMOS static RAM board. 10 MHz. low power less than 4 watts. DMA compatible. 24 bit addressing.

MEM-64180A	*64K A & T*	**$549.95**
MEM-64180C	*64K CSC*	**$698.95**

64K RAM 16 - CompuPro

32K x 16 bit or 64K x 8 bit low power static RAM board. 10 MHz. 24 bit addressing.

MEM-32180A	*RAM 16 A & T*	**$598.95**
MEM-32180C	*RAM 16 CSC*	**$698.95**

64K STATIC RAM - SSM

IEEE 696 S-100 standard. up to 6MHz 8 Bit. 12MHz 16 Bit. 24 Bit extended addressing. disable-able in 2K increments

MEM-64300A	*A & T*	**$499.95**

64K STATIC RAM - Mem Merchant

64K static S-100 RAM card. 4 to 16K banks up to 8 MHz.

MEM-64400A	*64K A & T*	**$499.95**

2065 64K RAM - C.C.S.

4 MHz bank port bank byte selectable. extended addressing. 16K bank selectable. front panel compatible.

MEM-64565A	*64K A & T*	**$349.95**

2066 64K RAM - C.C.S.

64K RAM board with bank and block select switching functions for Cromemeco Cromix & Alpha Micro.

MEM-64566A	*64K A & T*	**$424.95**

64K EXPANDORAM II - SD Systems

Expandable RAM board from 16K to 64K using 4116 RAM chips.

MEM-16630A	*16K A & T*	**$344.95**
MEM-32631A	*32K A & T*	**$364.95**
MEM-48632A	*48K A & T*	**$384.95**
MEM-64633A	*64K A & T*	**$399.95**

MEMORY BANK - Jade

4 MHz S-100 bank selectable expandable to 64K

MEM-99730B	*Bare board w manual*	**$49.95**
MEM-99730K	*Kit with no RAM*	**$179.95**
MEM-32731K	*32K kit*	**$199.95**
MEM-64733K	*64K kit*	**$249.95**
Assembled & Tested		**add $50.00**

32K RAM 20 - CompuPro

32K static RAM. up to 10 MHz. disable-able in 4K banks. bank select or 24 bit addressing.

MEM-16180A	*16K A & T*	**$259.95**
MEM-16180C	*16K CSC*	**$324.95**
MEM-24180A	*24K A & T*	**$324.95**
MEM-24180C	*24K CSC*	**$384.95**
MEM-32185A	*32K A & T*	**$384.95**
MEM-32185C	*32K CSC*	**$449.95**

16K STATIC RAM - Mem Merchant

4MHz lo-power static RAM board. IEEE S-100. bank selectable. addressable in 4K blocks. disable-able in 1K segments extended addressing.

MEM-16171A	*16K A & T*	**$149.95**

S-100 I/O Boards

SYSTEM SUPPORT 1 - CompuPro

Real time clock. three 16 bit interval timers. dual interrupt controllers(15 levels). up to 4K EPROM RAM. RS-232C serial channel. provision for 9511A 9512 math chip.

IOX-1850A	*SS1 A & T*	**$359.95**
IOX-1850C	*SS1 CSC*	**$459.95**
IOX-1855A	*with 9511 A & T*	**$554.95**
IOX-1855C	*with 9511 CSC*	**$654.95**
IOX-1860A	*with 9512 A & T*	**$554.95**
IOX-1860C	*with 9512 CSC*	**$654.95**

INTERFACER 1 - CompuPro

2 serial I O ports 50-19 2K baud.

IOI-1810A	*A & T*	**$218.95**
IOI-1810C	*CSC*	**$288.95**

INTERFACER 2 - CompuPro

3 parallel. 1 serial. & interrupt timer.

IOI-1820A	*A & T*	**$218.95**
IOI-1820C	*CSC*	**$288.95**

INTERFACER 3 - CompuPro

5 or 8 channel serial I O board for interrupt driven multi-user systems up to 250K baud.

IOI-1835A	*5 port A & T*	**$558.95**
IOI-1835C	*5 port CSC*	**$628.95**
IOI-1838A	*8 port A & T*	**$628.95**
IOI-1838C	*8 port CSC*	**$749.95**

INTERFACER 4 - CompuPro

3 serial. 1 parallel. 1 Centronics parallel.

IOI-1840A	*A & T*	**$314.95**
IOI-1840C	*CSC*	**$414.95**

MPX - CompuPro

Multi-user I O multiplexer & interrupt controller with on-board 8085A-2 CPU & 4K or 16K of RAM.

IOI-1875A	*4K MPX A & T*	**$444.95**
IOI-1875C	*4K MPX CSC*	**$534.95**
IOI-1880A	*16K MPX A & T*	**$584.95**
IOI-1880C	*16K MPX CSC*	**$674.95**

I/O-8 - SSM Microcomputer

Eight software programmable serial I O ports. 110 -19.2K Baud. ideal for multi-user systems.

IOI-1018A	*A & T*	**$469.95**

I/O-5 - SSM Microcomputer

Two serial & 3 parallel I O ports. 110-19 2K Baud.

IOI-1015A	*A & T*	**$289.95**

MPC-4 - SD Systems

Intelligent 4-port serial I O card. on-board Z-80A. 2K RAM. 4K PROM area. on-board firmware. fully buffered. vectored interrupts. four CTC channels. add to SD Board set for powerful multi-user system.

IOI-1504A	*A & T w software*	**$495.00**

I/O-4 - SSM Microcomputer

2 serial I O ports plus 2 parallel I O ports.

IOI-1010B	*Bare board w manual*	**$35.00**
IOI-1010K	*Kit with manual*	**$179.95**
IOI-1010A	*A & T with manual*	**$249.95**

2830 6 PORT SERIAL - C.C.S.

Six asynchronous RS-232C serial I O ports with programmable baud rates.

IOI-1040A	*A & T with manual*	**$529.95**

2710 4 PORT SERIAL - C.C.S.

Four RS-232C serial I O ports with full handshaking.

IOI-1060A	*A & T with manual*	**$319.95**

2719 2 SER & 2 PAR - C.C.S.

Two RS-232C serial I O ports plus two 8 bit parallel I O ports.

IOI-1080A	*A & T with manual*	**$349.95**

Prices may be slightly higher at our retail locations. Please call the store nearest you for local price and availability.

An Editor-Assembler For the Color Computer

Dennis Wilkins

Although the Color Computer belongs to my kids, I occasionally get a chance to play with it. Radio Shack has been quite open about describing the technical features of the Color Computer, and the 6809 processor is a very capable CPU. But without a good monitor and editor-assembler it can't be fully utilized. EDTASM+ from Radio Shack is the editor-assembler we have been waiting for.

I bought EDTASM+ when the kids weren't looking and managed to get it home without their realizing that Dad had bought a non-game program cartridge for their machine. That night, after the little critters were tucked away, I plugged in the new pack and powered up. The TV flickered to life, and the familiar green screen printed out EDTASM+ 1.0, COPYRIGHT 1981 BY MICROSOFT. Boot time for the 8K program is about one second. Loading such a large program from cassette would take nearly a minute.

What is EDTASM+

EDTASM+ is an editor, an assembler, and a monitor (named ZBUG) for the TRS-80 Color Computer. It comes in a ROM cartridge, and is designed to be used with a tape based 16K or 32K unit. It does not require the Extended Color Basic. And it does not use up precious RAM (well, only about 500 bytes for program overhead). Presumably a disk-based editor will be available from Radio Shack some day (there are some being advertised from other firms already).

creative computing
SOFTWARE PROFILE

Name: EDTASM+
Type: Editor/assembler
System: TRS-80 Color Computer
Format: ROM cartridge
Language: Machine
Summary: Finally a ROM cartridge for Dad!
Price: $49.95
Manufacturer:
Radio Shack
1800 One Tandy Center
Fort Worth, TX 76102

So, what has Microsoft accomplished with this new package? Quite a lot. The ZBUG monitor is a fine utility itself. It allows you to view any memory location in several modes.

The byte mode displays the value of one memory location (one byte of memory) per line. Normally the bytes will be displayed in hexadecimal, but can also be set to decimal or octal representation. There is a word mode which displays two bytes of code per line.

The ASCII mode displays the character representation of any byte between 21 and 7F (hexadecimal), which makes it easy to decipher text buried in a program. Code outside of this range is displayed as a blank. I think it would have been better to revert to byte representation for non-ASCII code.

ZBUG also has a mnemonic mode which automatically disassembles one to five bytes of memory into one line of assembly language. A built-in disassembler — I certainly hadn't expected that from Radio Shack.

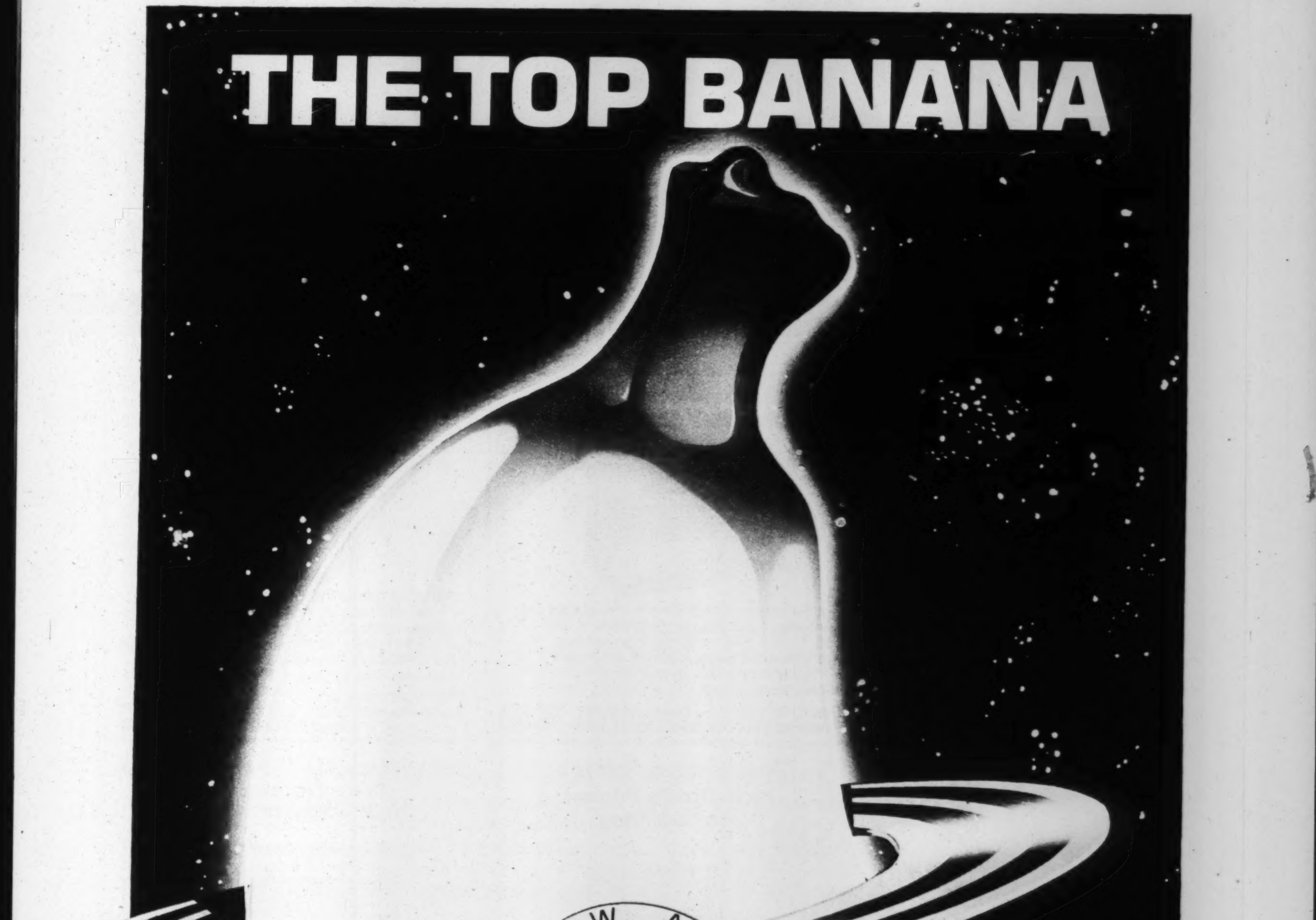
When viewing memory on screen, ZBUG allows you to advance to the next memory location or back up to the previous one using the down/up arrows, and to change the content of RAM in the byte, word, ASCII, or mnemonic modes (although in the mnemonic mode you must enter the OP codes, rather than assembly language).

ZBUG also allows you to display a range of memory locations — even a whole program — with one command, and send the listing to the video screen or to a printer. Thus, you can produce a disassembled listing of any portion of the Color Computer memory. Times have changed since the days Radio Shack wouldn't admit there was any software in a TRS-80.

ZBUG has some additional features which are most useful for debugging assembled programs. In addition to its byte, word, ASCII, and mnemonic modes, ZBUG has three sub-modes available: numeric mode, symbolic mode, and half-symbolic mode. When used with the mnemonic mode, the numeric mode will not show the labels used in your program, but will show the memory address indicated by any label. The symbolic mode shows the actual labels used in a program. Half-

---

Dennis J. Wilkins, 4000 Capitol Drive, Fort Collins, CO 80526.



THE TOP BANANA
GEBELLI
SOFTWARE
GAMES
GEBELLI
SOFTWARE INC.

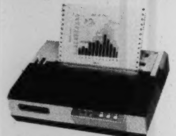
CIRCLE 176 ON READER SERVICE CARD

FOR INFORMATION ON A GREAT BUNCH OF GAMES, WRITE TO:
GEBELLI SOFTWARE INC., 1787 TRIBUTE ROAD, SUITE G,
SACRAMENTO, CALIFORNIA 95815 (916) 925-1432

OUR PRICES, SELECTION AND SAME-DAY SHIPPING MAKE US COMPETITIVE.

Red Baron. Home of the Nation's

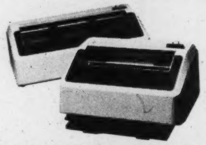
NEC 8023
Outstanding Graphics, Print Quality & Performance



144 x 160 dots/inch • Proportional Spacing • Lower case descenders • N x 9 dot matrix • 8 character sizes • 5 unique alphabets • Greek character set • Graphic symbols • 100 CPS print speed • Bi-directional logic-seeking • Adjustable tractors • Single-sheet friction feed • Vertical & horizontal tabbing

NEC 8023
Dot Matrix..........List $795 **$Call**

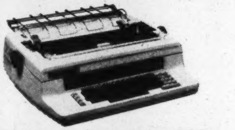
IDS Prism 80/132
Affordable Color, Speed



Dot Resolution Graphics • 9-wire staggered printhead • Lowercase decenders • Over 150 CPS • Bi-directional, logic-seeking • 8 character sizes • 80-132 columns • Proportional spacing • Optional Color • Text justifications

Prism 80 .... Base List $999
Prism 132 ...... Base List $1,299 **$Call**

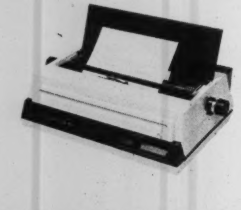
NEC Spinwriter 7700 & 3500
Daisy Wheel Quality Leader



High speed, letter quality • 55/33 CPS • Typewriter quality • Bi-directional printing & proportional spacing • Quiet • OCR quality print • Hi-res plotting/graphing • Quick change ribbon • Optional cut-sheet feeder, horizontal or bidirectional tractors • Prints up to 8 copies.

NEC Spinwriter RO
Serial Parallel 77xx ....List $3055 **$2500**
35xx ....List $2290 **$1900**

Smith Corona TP-1
Daisy Wheel Printer For Under $900



Letter quality • Standard serial or parallel data interface • Drop-in ribbon • 144 WPM • Various fonts available • Loads paper like typewriter • Handles single sheets for forms

Smith Corona TP-1 ..... List $895 **$Call**

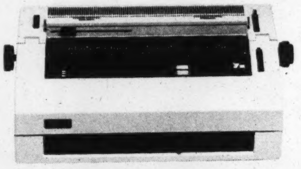
The Epson Series
High-Quality Printers at a Low Price.

FREE GRAFTRAX PLUS

Epson MX80 ....List $645
Epson MX80FT ......List $745 **$Call**
Epson MX-100 ....List $995

Full Line of Epson Accessories

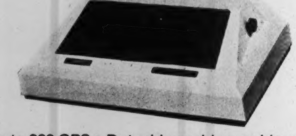
Brothers HR-1 Daisy Wheel
Perfect for quality, quiet word processing.



• 16 CPS • Prints up to 6 copies • Bidirectional • Cloth or carbon quick-change cassette ribbon • Quiet, efficient operation for word processing •

Brothers HR-1 (Parallel) List $1,100
Brothers HR-1 (Serial)..List $1,200 **$Call**

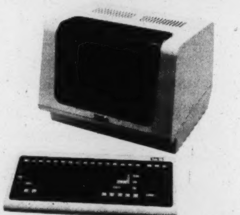
Anadex Silent Scribe
The Quiet Serial Matrix Impact Printer



Up to 200 CPS • Dot addressable graphics • Parallel and serial interfaces standard • Switch selectable protocol • Cartridge ribbon • Foreign character sets • Underlining • 1.5K to 3.5K buffer • Correspondence quality print

Anadex DP-9500A..... List $1,725
Anadex DP-9620A..... List $1,845 **$Call**
Anadex DP-6000...... List $3,250

Televideo CRT's
Price, Performance & Reliability



910.......List $699
925.......List $995
950.......List $1195

$Call For low Prices

Interface Equipment
Complete Stock of Options, Cables and Accessories.

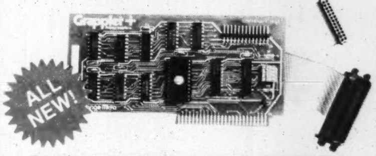
CCS APPLE SERIAL Interface & Cable . **$150**
ORANGE INTERFACE for Apple II
Parallel Interface Board & Cable **$90**
NOVATION CAT Acoustic Coupler...... **$175**
NOVATION D-CAT
direct connect modem **$180**
COMPLETE STOCK OF EPSON
ACCESSORIES.................... **$Call**
CUSTOM PRINTER CABLES FOR Apple, Atari, IBM, TRS-80 (all models) ..... **$Call**
HAYES MICROMODEM II............. **$300**
PRINTER STANDS: Large **$99**
Small............ **$25**
PRINTER RIBBONS—Most Types ..... **$Call**

OUR PEOPLE MAKE US EXPERTS.

Largest Computer Printer Inventory.

The Grappler+™

Apple® Graphics Interface



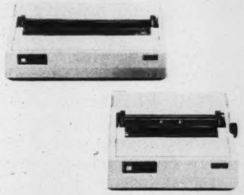
• Graphic and text screen dumps • Dual Hi-Res Graphics • Printer Selector Dip Switch • Apple III compatible* • Inverse Graphics • Emphasized Graphics • Double Size Picture • 90° Rotation • Center Graphics • Works with Pascal and CPM® • No software needed

Grappler+ $175

*Requires software driver
Apple is a registered Trademark of Apple, Inc.

The Okidata Series

Hi-Res or TRS 80 Block Graphics

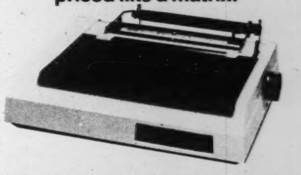


120 CPS • 9 x 9 Matrix • Bidirectional logic seeking printing • Lower case descenders • four print styles • Optional Hi-Res Graphics

Okadata 82A. . . . . .List $649
Okadata 83A (w/Tractor) . . List $995 $Call

IDS Microprism 480

Prints like a daisy, priced like a matrix!



• Correspondence Quality in a Single Pass • Dual Speed 75, 110cps • Proportional Spacing • Bidirectional Logic Seeking Head • Platen pin or pressure feed • 24x9 dot matrix • 10, 12, 16.8 Characters per inch • Double width Characters

IDS Microprism 480. . . List $799 $Call

Our People, Our Product: Both Are Specialized.

Because our salespeople are printer specialists, they know the capabilities of each printer—and how to match one to your exact need. Red Baron's volume stocking assures a low, low price on a wide array of major brands. We're sure you'll like the product and services you get from Red Baron, and we know you'll love our Customer Benefit Package; an exclusive at Red Baron.

Customer Benefit Package

1. Free Expert Consultation. Before you buy, after you buy. 2. Technical Staff. Even your most involved questions get quick, helpful answers from our staff of printer technicians. 3. Free Catalog. Get your informative catalog with printer comparison chart and print samples today! 4. Warranty. The manufacturer's warranty applies where applicable. 5. Same-Day Shipping. Your order is shipped the same day when you call before 11:00 a.m. 6. Free MasterCard and Visa. Call us toll-free and charge your printer to your credit card. 7. We Stock What We Sell. No bait and switch, no hassle. We make every effort to keep a large stock of our advertised products. 8. APO/FPO Orders Welcome.

Other Quality Printers at Red Baron

C. Itoh 8510 Prowriter	$845	$Call
Diablo 630/6	$2995	$2570

Here's How To Order:

Phone orders are welcome; same-day shipment on orders placed before 11:00 a.m. Free use of MasterCard and Visa. COD's accepted. Personal checks require 2 weeks clearance. Manufacturer's warranty included on all equipment. Prices subject to revision.

Call Toll Free For Catalog:

(800) 854-8275
CA, AK, HI (714) 630-3322

Red Baron
COMPUTER PRODUCTS

1100 N. TUSTIN #207, ANAHEIM, CA 92807

CIRCLE 262 ON READER SERVICE CARD

© Red Baron Computer Products, 1982

symbolic mode shows all memory location identifiers in their symbolic form, but displays operands as addresses.

ZBUG even understands symbols used in commands when an assembled program is in memory. For example, if you labeled the beginning of a program residing at 3F00 hex START, you could command ZBUG to display the first byte of the program by typing START/, or by typing 3F00/. And you could run the program with the command G START, rather than specifying the start address.

There are other useful capabilities in ZBUG. Up to eight break points can be set to halt execution at specified points in a program run. The breakpoints can be individually reset, or all breakpoints cancelled, and the memory locations of all currently set breakpoints can be displayed. Programs can be single stepped, for ease of debugging, and all register values and flag conditions can be observed after any step or after a breakpoint halt.

"Actually, I'm not even sure if I want to know what 'Punk Fortran' is."

There is a transfer command in ZBUG to move code from one memory area to another. This command does not modify code to correct address references (as the Basic renumber does for GOTOs and GOSUBs), it simply copies the code from one location to another. ZBUG can save a specified block of memory to cassette, with loading and start addresses specified, and can read a tape into memory. This allows linking short routines into a longer program with the proper planning.

ZBUG also has a calculator mode which can perform arithmetic, relational, and logical operations using hexadecimal, decimal, or octal numbers; ASCII characters; and symbols for logical operations. Logical operators allowed are: equals, not equal, addition, subtraction, multiplication, division, modulus, positive, negative, logical shifts, complements, and logical AND, OR, and XOR.

In the calculator mode ZBUG allows you to mix modes. For example, you can compute the sum of A3FE hexadecimal plus 1354 decimal. Or you can command the monitor to display the memory location described by the sum of 3471 octal plus 1A34 hexadecimal. It is possible to control the number base of inputs and the number base of outputs separately, so that you can type commands in decimal, but have outputs displayed in hexadecimal. Note that since the calculator mode of ZBUG was intended as an aid during program writing, it will not display negative values and the maximum value it will display is FFFF hex (65535 decimal).

The Editor

The monitor is very useful, but what about the editor. The editor is quite similar to Radio Shack's editor-assembler for the TRS-80 Model I, except that you must use 6809 mnemonics instead of Z80 mnemonics. The editor has the usual auto line numbering, insertion, replacement, and deletion of lines, a renumber command, an edit line command, save and load to cassette, screen print, and line printer commands. It also has a handy copy command to duplicate code, a move command to block move code, a find command to find occurrences of a specified string of characters, a ZBUG command to jump to ZBUG (without changing any of the text buffer), and a Basic command to jump to Basic (which destroys the text buffer). The ability to jump to ZBUG, make calculations or number/symbol conversions, and return to the editor with all text intact is very convenient.

The editor allows you to work in decimal or hexadecimal, but has a slight inconsistency with ZBUG: default is decimal in the editor and hexadecimal in ZBUG. ZBUG allows you to define the number base in which you wish to work, but the editor requires that you specify hex each time you mean hex. Otherwise it thinks you mean decimal.

One useful feature of EDTASM+ is its ability to edit Basic programs. It has some useful commands which are not in the edit system of Extended Basic, such as the Find and Copy commands, and the ability to scroll lines with the arrow keys. The manual states that Basic programs can be edited, but does not describe how.

Since EDTASM+ can be used with a non-Extended Color Basic machine, it is an inexpensive way to obtain some editing features.

The Basic program must be saved in the ASCII mode (CSAVE"PROGRAM",A) from Basic, then loaded into the text buffer of the editor from tape. It must be saved again from the editor, and then CLOADed when you have returned to Basic.

You cannot just call the editor from Basic to edit programs. For complex editing of long Basic programs it is worth the effort. For quick changes to short programs the normal Basic EDIT command is best.

Since EDTASM+ can be used with a non-Extended Color Basic machine it is an inexpensive way to obtain some editing features. Also, the editor allows you to append text from a tape file onto the end of the current text buffer in memory. This can be used in both Basic and assembly language programming to link short routines into one long program.

There's Even an Assembler

Yes, they even remembered the assembler. The assembler is activated from the editor by typing A filename. This command assembles the text in the editor and writes it to a cassette file named "filename." If you want to assemble the code and test it before saving it to cassette, there is an in-memory switch (IM) available.

Eight other switches for the

assembler control error display mode, listing mode (short listing, no symbol table in listing, list to printer, and no listing), compilation, and method of specifying start location of assembled code (absolute origin and manual origin).

A /NO command explained in the manual on page 13 is supposed to prevent object code from showing in the assembler listing. A /NO command explained on page 16 is supposed to prevent object code from being recorded to memory or to tape. My tests show that the function of /NO is as explained on page 16 (it can be used to test for compile errors without storing the object code).

EDTASM+ seems to work well, and has an excellent interface between the monitor and editor. It certainly provides more access to the TRS-80 Color Computer than has been available before.

The Manual

The EDTASM+ manual is, for the most part an example of clear writing style and completeness. There are, however, not many examples of how to write in assembly language. The manual states right at the beginning: "This manual demonstrates how to use the Editor-Assembler+. It will not teach you how to program in assembly language. Radio Shack has an excellent book devoted to the subject. It's Catalog Number is 62-2077. You can purchase it through any Radio Shack store."

This statement is correct, up to the last line. At the time of this writing book 62-2077 was not available. It should be available by the time this is published. There are several other books available which discuss programming of the 6809, but not at Radio Shack. The Radio Shack book could be very useful if it has been specifically written for the Color Computer hardware/firmware.

The manual does describe how to use the monitor, the editor, and the assembler, and includes a list of ROM routine entry points (as do the Basic and Extended Basic manuals). The shack seems to be getting downright helpful. The manual even has a section on running machine code routines produced by EDTASM+ from Basic programs, including parameter passing.

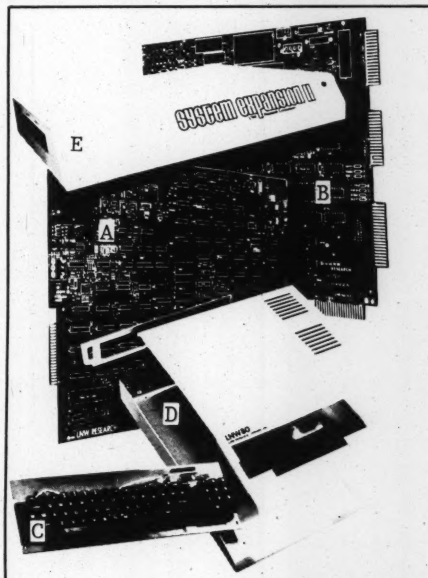
The manual devotes 26 pages to operating EDTASM+, has a 23 page-reference section on 6809 assembly language, and 11 pages of appendices (editor command set, assembler commands, ZBUG commands, error messages, memory map, and ROM routine descriptions). The appendices on commands also reference the page on which the command is discussed, although I found a few errors in that regard.

The only thing lacking in the manual is graphics. Several sections describe a video display without showing a graphic representation of it, although page 14 does show two examples of an assembly display listing. There are also a couple of editor commands which are not fully explained in the editor chapter (Find and Verify file), but are mentioned in the appendix. And I found a few types which were not difficult to decipher. On the whole, the manual is organized well and clearly written.

Was It Worth the Wait?

I must admit that I am impressed with this offering from Radio Shack. They are not just supporting the Color Computer with game packs these days. This offering allows the serious programmer to produce some compact programs with very high speed graphics, and allows the beginner and hobbyist to explore the inner workings of his Color Computer. EDTASM+ is $49.95 at your local Radio Shack store. □

COMPUTER KITS – FROM $69.95



LNW SEMI-KITS can save you hundreds of dollars. By obtaining your own parts at the lowest possible cost and assembling the **LNW SEMI-KITS,** you can have the most highly acclaimed microcomputer in the industry – the **LNW80**. The **LNW SEMI-KITS** are affordable modules. You can start with a modest cassette system and expand to a full 4Mhz TRS-80 compatible system with 5 or 8 inch double density disks and color at any time.

A. LNW80 CPU – Made of high quality FR4 glass epoxy double sided circuit material, with plated-through holes and gold edge connector. It is fully solder-masked and silk screened. Here are just some of the outstanding features you will have when your **LLNW80** CPU board is fully assembled: • 16K RAM • Color and black and white video • 480 x 192 high resolution graphics • 64 and 80 column video • 4 Mhz Z80A CPU • Upper and lower case display • 500 and 1000 baud cassette I/O –**$89.95**

B. SYSTEM EXPANSION – Expand the **LNW80** computer board, **TRS-80** and **PMC-80** computer with the following features: • 32K memory • Serial RS232C and 20Ma port • Real time clock • Parallel printer port • 5 inch single density disk controller • Expansion bus (screen printer port) • Onboard power supply • Solder-masked and silk screened legend – **$69.95** (tin plated contacts) – **$84.95** (gold plated contacts)

C. KEYBOARD – 74 key expanded professional keyboard – includes 12 key numeric keypad. Fully assembled and tested. – **$99.95**

D. COMPUTER CASE – This stylish instrument-quality solid steel case and hardware kit gives your **LNW80** that professional factory-built appearance. – **$84.95** Add $12.00 for shipping.

E. SYSTEM EXPANSION CASE – This stylish instrument-quality solid steel case and hardware kit gives your **SYSTEM EXPANSION** interface that professional factory-built appearance. – **$59.95** Add $10.00 for shipping.

F. LNW80 CPU – HARD TO FIND PARTS KIT – **$82.00**

G. LNW80 VIDEO – HARD TO FIND PARTS KIT – **$31.00**

H. SYSTEM EXPANSION – HARD TO FIND PARTS KIT – **$27.50**

I. LEVEL II ROM set. (6 chip set) – **$120.00**

VISA and **MasterCard** accepted. Add $3.00 for shipping plus $1.00 for each additional item. All shipments via UPS surface. Add $2.00 for U.S. Mail. Shipments outside continental U.S.: funds must be U.S. dollars. Sufficient shipping costs must be included with payment.

ORDERS & INFORMATION – (714) 544-5744
SERVICE – (714) 641-8850

LNW Research Corp.
2620 WALNUT Tustin, CA. 92680

CIRCLE 203 ON READER SERVICE CARD

K—DOS

An Alternative to Atari DOS

Sheldon Leemon

K-DOS from K-Byte is an alternative to the Atari Disk Operating System, DOS II. The file management system of *K-DOS* is compatible with Atari DOS, but offers a greater level of control over peripheral devices and memory. Although it offers many features which will be appreciated by every Atari user, *K-DOS* will be of most use to the serious programmer.

Since the benefits to be gained by using *K-DOS* are the result of certain trade-offs, the potential buyer should think hard about how much a more convenient disk operating system is really worth.

Chief among these trade-offs is the amount of memory that *K-DOS* leaves available to the user. *K-DOS* is memory resident, so most of its features are immediately accessible, but it also takes up a great deal of space. With a Basic cartridge inserted, the amount of free memory available in a 40K system is 25,228 bytes. This is almost 7K less than the 32,274 bytes available with Atari DOS, or the 31,758 bytes available with OS/A+.

Besides reducing the amount of memory available for programming, the large size of *K-DOS* puts the start of low memory above $3000. (An optional program included with the package lets you remove the plain English error messages, which saves enough bytes to bring the end of *K-DOS* just below $3000). Machine language programs which are assembled to run just above the end of Atari DOS, may conflict with *K-DOS*, and may not run under it.

If you have memory to spare, however, *K-DOS* offers many attractive features. It is, for example, a pleasure to use: all DOS functions are accessible from Basic, Pilot, the Assembler cartridge, or whatever program environment you happen to be in.

> ***If you have memory to spare, K-DOS offers many attractive features.***

Since *K-DOS* is command driven, you need not call up a menu to execute a DOS function. You simply precede the command by a comma (or some other character which you can define as significant to DOS), and the DOS function is executed without changing program environments.

The syntax required for command lines is flexible, so commas can be replaced by spaces, lower case is acceptable, and the DOS environment automatically resets the inverse character shift. Device defaults are supplied whenever possible, and short abbreviations are allowed, so a minimum of keystrokes is required to perform any function. Error messages appear in plain English, rather than a frustrating number code.

creative computing
SOFTWARE PROFILE

Name: K-Dos
Type: Operating system
System: Atari 400/800, 48K preferable
Format: Disk
Language: Machine
Summary: Versatile, but memory-hungry alternative to Atari DOS
Price: $89.95
Manufacturer:
K-Byte
P.O. Box 456
1705 Austin
Troy, MI 48099

Unlike OS/A+, which puts you back in the operating system every time you hit System Reset, *K-DOS* will only bypass Basic if you hit the Start key along with System Reset. And unlike Atari DOS, the device handler for the 850 interface unit boots automatically if it is turned on. There is no need for a separate AUTORUN.SYS file.

The reason that *K-DOS* can let you use DOS command lines from Basic is that it re-routes all input to the line editor (although it gives you a command, KILL, which will take its "hooks" out of the handler table if desired).

This greater level of control over the system is characteristic of *K-DOS*. For example, the 6502 BREAK instruction is vectored to get you back to DOS any time the instruction is encountered, rather than having the system hang up. You may get a little better idea of what this means if you slip in the Basic cartridge and type INPUT (RETURN).

With Atari DOS II, the system locks up, and the only way to recover is to turn the computer off and reboot. With *K-DOS*, a BRK message appears, and you enter DOS. You should even be able to recover from the dreaded "editing lock-up," which occurs when Basic moves a block of exactly 256 bytes (You must still know enough about how Basic works to reset the statement pointers, however, as that particular bug tampers with your program code before it crashes the system).

Another aspect of the system control offered by *K-DOS* is that it allows you to stop disk I/O just by hitting the BREAK

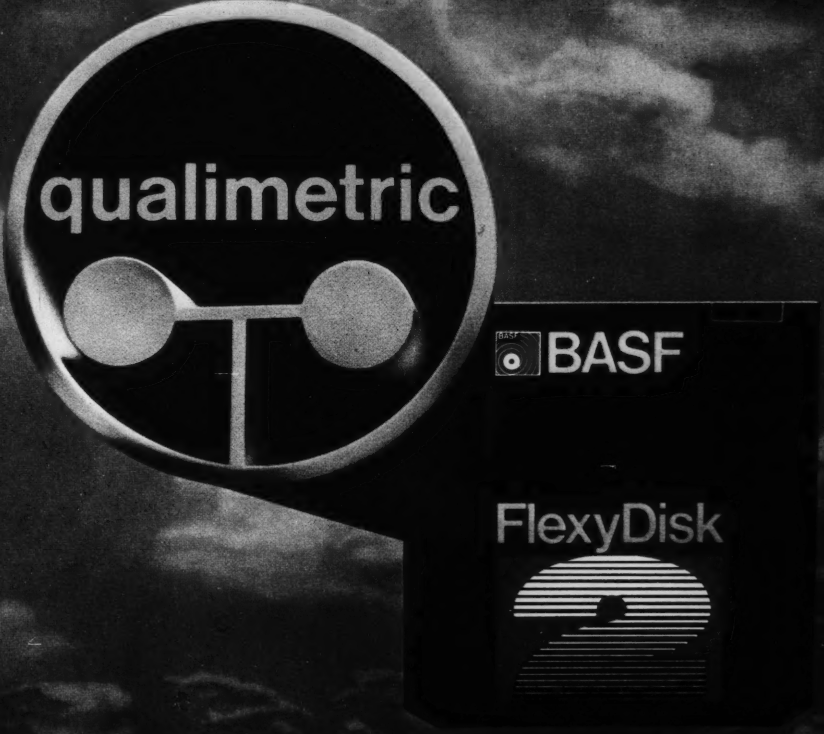
Sheldon Leemon, 14400 Elm, Oak Park, MI 48237.

BASF QUALIMETRIC™
A TOTALLY NEW DIMENSION OF QUALITY.

From BASF comes a totally new level of excellence in magnetic media—the Qualimetric standard, a standard so advanced that BASF FlexyDisks® are confidently backed by the industry's only lifetime warranty. The Qualimetric standard is maintained without compromise through every step of BASF design, production, inspection, and testing... reflecting an unwavering BASF commitment to media fidelity and durability.

*Our FlexyDisk jacket, for example, incorporates a unique two-piece liner that not only traps damaging debris away from the media surface, but also ensures precise media-to-head alignment. The result—certified 100% error-free performance, backed by BASF's exclusive lifetime warranty.**

For information security, tomorrow and beyond, look for the distinctive BASF package with the Qualimetric seal. Call 800-343-4600 for the name of your nearest [illegible]



ENTER TOMORROW ON BASF TODAY

BASF

**Contact BASF for warranty details.* © 1982, BASF Systems Corporation, Bedford, MA

CIRCLE [illegible] ON READER SERVICE CARD

IS THIS LEVEL OF RELIABILITY REALLY NECESSARY?

ACCUTRACK

ACCUTRACK
FLEXIBLE DISKS
ACCUTRACK
MINI FLEXIBLE DISKS
ACCUTRACK
ACCUTRACK
ACCUTRACK
FLEXIBLE DISK
KYBE

If you've ever lost data due to a faulty disk, you know how important reliability can be.

That's why Accutrack disks are critically certified at 2-3 times the error threshold of your system. Why they're precision fabricated for higher signal quality, longer life and less head wear. And why we take such extra steps as testing single-density mini disks at double-density levels. So you don't have to worry about the reliability of your media.

Accutrack disks. OEMs have specified them for years. You can trust them for your data. Call toll-free (800 225-8715) for your nearest dealer.

ACCUTRACK
Dennison KYBE Corporation
82 Calvary Street, Waltham, Mass. 02254
Tel. (617) 899-0012; Telex 94-0179
Outside Mass. call toll free (800) 225-8715
Offices & representatives worldwide

CIRCLE 197 ON READER SERVICE CARD

Dealers: Give your customers a choice—Accutrack's OEM performance as well as your heavily advertised brand. We have the industry's only complete line of disks, cassettes and mag cards, including virtually all special formats.
If you want a quality line, small minimums, the ability to mix and match, private labeling, fast delivery and great price, call today. Find out how responsive a media supplier can be.

key, without destroying your data. It also tries very hard to read and write marginal sectors before bombing out, which is important, given the notorious speed fluctuation of older Atari disk drives.

K-DOS puts some nice touches on some of the original DOS functions. For example, INIT combines formatting and writing DOS files to the new disk in one operation, although these functions are still available separately. The duplicate disk function offers the option of a straight sector copy for boot-disks that do not have file information on them, and also allows the faster write without verify and continuous retrying of bad sectors.

There is a separate APPEND command, which allows you to enter data at the end of a file directly from the keyboard. The append function uses any space available in the last sector, rather than starting a new sector as Atari DOS does. The binary load command prints to the screen the location in memory into which the file is being loaded, if you so desire, which is much more convenient than reading the headers and calculating the addresses by yourself.

But *K-DOS* doesn't take up all that memory for the sake of a few slight modifications. It also contains a complete machine language monitor which allows you to examine memory in hexadecimal and ASCII formats, alter memory by typing in either hex or ASCII values, and examine and alter the contents of the registers. *K-DOS* gives you two ways to execute a machine language program. GO runs the program after closing all devices, and does not preserve the registers. PROCEED continues a program after a breakpoint has been reached, without changing the contents of the registers or the status of any device, making it a very handy debugging tool.

Similarly, the command XIT allows you to get back to a Basic program that calls DOS, and continues to run that program from the point at which DOS was called.

A null device handler has been added, so that you can test I/O operations quickly by directing them to N:. LOMEM lets you examine and alter the bottom of memory available to a cartridge. This allows you to reserve space for machine language programs, or just to reduce the amount of memory available to see if a Basic program will run on the minimum 16K system. UDC allows you to add your own user-defined commands to the system.

In addition, *K-DOS* offers many commands which allow you to access certain routines used internally by DOS, just by giving a one-word command. For example, COLD and WARM provide an easy way to coldstart or warmstart a cartridge. RESET reboots the 850 handler when you have expanded the drive buffers—or just forgotten to turn it on when you booted up.

TEXT corresponds to a GRAPHICS 0 call in Basic, and opens the screen device, which is handy for moving the display list when you want to load a program into high memory. CLOSE closes all files, turns off the sound, resets VBLANK vectors, and turns off Player-Missile graphics. ER followed by a number will print the English error message for that error number, which is very handy when you want to interpret I/O errors that are generated by Basic.

> ***It is a convenient tool for the user who is serious about programming.***

None of these functions is earth-shaking, and all can be accomplished in other ways with a little effort, but the author's attitude was that as long as the routines for doing them were already in DOS, it made sense to allow them to be accessed easily.

Unfortunately, the lack of depth in the documentation runs somewhat counter to this intention of allowing the programmer easy access. The glossy K-DOS Handbook is nicely bound, comes with a pocket summary card, is clearly written, gives examples of the proper syntax for each command, and covers most of the commands very well.

However, it treats some of the more esoteric commands in a cursory manner. Take, for example, the explanation of the UNLOAD command: "Tries to erase area where cartridge is; unloads any RAM based cartridge and resets LOMEM back to end of DOS." The beginner will no doubt read this sentence, re-read it once to verify that all of the words are in English, and then press on, no better or worse for the experience.

The experienced user, on the other hand, might gather from this explanation that it is possible to load a program into RAM, and fool the system into thinking that the program is cartridge-based, allowing an easy transition back and forth between that program environment and DOS. The inference would then be that the UNLOAD command erases this program, and lets the system know that no cartridge is present. But how do you set up this "RAM based cartridge" in the first place? No clue is given, leaving the experienced user perhaps more frustrated than the beginner.

Another example of a similar sort is the system equate files that are supposed to give the user access to system routines, such as the one to type text messages from a buffer. There are no detailed examples of how to use them, however, and the internal commenting is too scanty to allow most users to benefit from them. Features like these could be real selling points to the ambitious programmer if they were treated less superficially in the documentation.

My impression of *K-DOS* is that aside from these omissions in the documentation, it is a convenient tool for the user who is serious about programming.

As one who uses his computer mostly for programming, I have found *K-DOS* especially helpful in developing software that combines Basic with machine language subroutines. But I think that *K-DOS* will be of much less interest to the casual programmer who may have less than 40K of memory.

While such a user might appreciate some of the features, he would probably never take advantage of the machine language monitor, the null device, or many of the other goodies which make *K-DOS* so big—and so expensive. If you fall into that category, you might be better off spending the money on something that will let you gobble dots, eradicate insects, or save the universe. ☐

Happy Hands

Offers Discounts on All

TRS-80™
COMPUTERS

We Have What You Are Looking For

- **Free Shipping Within United States**
- **26-1006 Mod III 48K $1955.00**
- **26-3004 16K Color 310.00**
- **26-3002 16K Color Ext. Basic 410.00**
- **26-3003 32K color 495.00**
- ***No Tax On Out of State Shipments***

For Additional Prices and
Shipping Information
Call Toll Free
1-800-545-9019
N.M. Residents Call 257-7865

or write

HAPPY HANDS
P.O. DRAWER I
RUIDOSO, NEW MEXICO
88345

CIRCLE 181 ON READER SERVICE CARD

Enhance your Apple II monitor with this versatile product.

MON+ by Microseeds

David H. Ahl

MON+ is an extension to the Apple II monitor, which enhances existing commands and adds some powerful new commands of its own.

Four years ago, when the Apple was introduced, the supplied monitor was more than adequate. It contains tools to display memory, disassemble code, add and subtract numbers, and read and write cassettes. Today, however, people are pushing the Apple farther perhaps than even the original designers envisioned. The disk drive has replaced the cassette recorder as the common I/O device. There are excellent assemblers and scores of hi-res games. However, these sophisticated applications must be done with, or perhaps despite, the existing monitor.

MON+ addresses many of the limitations of the existing Apple monitor with modified extensions of the existing commands as well as six new commands. All of these commands are shown in Table 1.

A particularly useful command for machine language programmers is the "single step and trace." For the most part, these commands are the same as the monitor's single step and trace commands, but were included mainly because the Auto-Start ROM lacks them.

Another useful command is "memory dump," which displays the contents of memory as hex bytes and ASCII characters. Memory dump is activated simply by typing the beginning and ending address of the memory area you wish to examine. For each address, MON+ displays the address and the contents of the next eight bytes. This format is the same as for a memory store, hence it is easy to change a displayed portion of memory using cursor moves and the forward arrow to re-enter the line.

To prevent information from scrolling by too quickly when large portions of memory are displayed, a "key check routine" is automatically called. This routine periodically checks to see if a key has been pressed, and if it has, pauses the display until another key has been pressed.

Among the commands not available in the Apple monitor at all, we found the "XB" the most useful. This is used to boot 3.2 disks on a 3.3 system. However, if a 3.2 boot fails, it will automatically try a 3.3 boot. Having accumulated over a four-year period a substantial library of Apple disks, many of which are 3.2 and most of which are not identified as to which DOS they contain, I find the command most useful. For my use, XB, by itself, has justified purchase of the MON+ system several times over.

Another nice feature of MON+, when used with the Auto-Start ROM is that hitting reset enters the monitor instead of Basic.

It should be noted that entering and exiting MON+ is done either from the Apple monitor or from Integer Basic. When Applesoft (ROM or language card version) is active, calls to MON+ are not possible.

MON+ is available in one ROM chip which resides in the empty D8 socket along side Integer Basic; this version costs $49.95. It is also available on disk for the Apple II Plus with the language card or equivalent. This version updates the INT Basic file so that MON+ is loaded with Integer Basic when the system is booted. List price for this version is $39.95. MON+ is available from Microseeds, Lakeview Terr., Stafford, CT 06076. ☐

CIRCLE 353 ON READER SERVICE CARD

Table 1. Commands of MON+

command	syntax
Memory dump	*addr* . *addr*
Page dump	*addr* P
Store string	*addr* : " *char char* ... "
	addr : ' *char char* ... '
Addition	*addr* + *addr*
Subtraction	*addr* – *addr*
Single step	*addr* S
Trace	*addr* T
Move memory	*addr* < *addr* . *addr* M
Zap memory	*byte* < *addr* . *addr* Z
Search (hex)	*addr* . *addr* ? *byte* b *byte* ...
(ASCII)	*addr* . *addr* ? " *char char* ... "
(wildcard)	*wbyte* < *addr* . *addr* ? *byte* b *wbyte* b *byte* ...
Read from disk	*addr* < *track* . *sector* R
Write to disk	*addr* < *track* . *sector* W
Enter monitor	•
Addresses of BLOAD	XA
Boot 3.2 disk	*byte* XB
Catalog	XC
Connect DOS	XD
Free disk space	XF
Exit ***MON+***	XX

ARCADE PAK #7
MOON PATROL
VC
ARTILLERY BARRAGE
TELENGARD
andromeda conquest
SORCERESS
microcomputer games
A DIVISION OF THE AVALON HILL GAME COMPANY

RISING STARS

What some have called "the best kept secret in the game software industry". Unleashed here are six new software games blending advanced graphics with precise elements of playability, challenge and intense fun for every gamer's tastes. Beyond these six new games are 26 more for you to consider . . . all we believe are the best software values for your money!

LEGIONNAIRE—Real-time simulation of tactical combat in Caesar's time. YOU as Caesar command up to ten legions. Finest **full-color graphics** plus playability way beyond the state of the art! Cassette . . . $35.00

V.C.—Faithfully recreates unconventional conflict in Viet Nam. YOU command chopper and artillery units, and face task of protecting civilian population where the enemy hides among the people. Cassette . . . $20.00
Diskette . . . $25.00

G.F.S. SORCERESS—Sci-Fi adventure game. YOU are Joe Justin trying to clear yourself of a false charge of mutiny and get back to the Galactic Federation Starship "Sorceress". Beautiful full-color manuals provide useful clues. Cassette . . . $30.00 Diskette . . . $35.00

ANDROMEDA CONQUEST—Vast scale space strategy game of galactic colonizing and conquest among unique star systems with strange life forms and alien technologies that provide exciting exploration and battle. Cassette . . . $18.00 Diskette . . . $23.00

MOON PATROL—Arcade Pak™ game of lunar invasion. Beats any quarter-gobbling game around! Four levels of increasing difficulty present new attackers to battle. Fast, furious and fun! Cassette . . . $25.00

TELENGARD—Dungeon adventure in a mysterious underworld with 50 levels of ever-more-complex mazes to explore. Real time fantasy and role-playing game. Using wits, magic and fast thinking, gamers fight monsters and reap valuable rewards. Cassette . . . $23.00
Diskette . . . $28.00

® Trademarks for Tandy Corp., Apple Computer, Warner Communications, International Business Machines and Commodore International Ltd.

Available at finer computer stores everywhere!

AH QUALITY

If your favorite dealer fails to have the games you want, call us toll free
1-800-638-9292

microcomputer games

® REGISTERED TRADEMARK OF MICROCOMPUTER GAMES, INC. DIVISION OF
The AVALON HILL Game Company

CIRCLE 118 ON READER SERVICE CARD

Avalon Hill MICROCOMPUTER GAMES
are compatible with the following computer systems:
TRS-80 Models I/III & Color®
Apple II®
Atari 4/800®
IBM P.C.®
Commodore VIC-20, CBM PET & 2001®

Empire of the Over-Mind

For specific information, such as machine compatibility, memory requirements, cassette or diskette availability and price, call us toll-free 1-800-638-9292 and ask for Operator 20, or write:
Avalon Hill Microcomputer Games, Dept. M-20
4517 Harford Road, Baltimore, MD 21214

Midway Campaign
COMPUTER BASEBALL
KNOCKOUT
galaxy
CONTROLLER
Stocks & Bonds
FOOTBALL
BOMBER ATTACK
Dnieper River Line
Foreign Exchange
ARCADE PAK #2
NORTH ATLANTIC CONVOY RAIDER
CONFLICT 2500
ACQUIRE
B-1 NUCLEAR BOMBER
Nukewar
GUNS OF FORT DEFIANCE
PLANET MINERS
KARMA

Casino Games For The Apple

Brian J. Murphy

Name your poison! Is it craps? Baccarat? Roulette? Poker? Keno? Blackjack? You can place $500 bets on any of these games, all night if you like, and never risk anything more substantial than the few cents of electricity it takes to run your Apple II with re-creations of the great casino games from Softape and Datamost.

Softape has four games currently on the market. They are *Roulette* and *Craps*, published in 1979; *Apple 21*, released in 1980; and *Draw Poker*, which came out last year. Softape was aiming for a detailed, highly realistic recreation of these games as played under casino rules, and they have succeeded quite well.

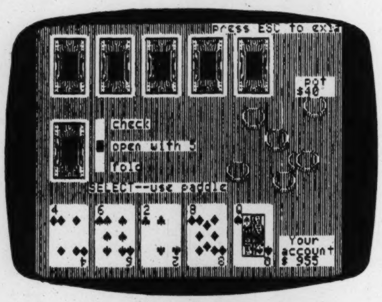
Draw Poker

Starting with the best of the lot, *Draw Poker*, you have a game which plays well with good graphics, screen action and sound effects. Author Ken LaBaw has devised for this solitaire game a computer opponent with two personalities. One is that of a plodding, fairly predictable, conventional player. When the dealer discards three cards you can be fairly sure it is holding only a pair. When it discards four, you have, more or less, a sure win.

The second personality is not as predictable. From the way it bets you might think it was holding three of a kind or a straight and fail to challenge it with a bet, only to find that it was holding a pair. In short, it will bluff.

creative computing
SOFTWARE PROFILE

Name: Draw Poker
Type: Gambling simulation
System: 48K Apple II, disk drive
Format: Disk
Language: Machine language
Summary: Great poker simulation
Price: $24.95
Manufacturer:
Softape
10432 Burbank Blvd.
North Hollywood, CA 91601



Draw Poker

Bets are $5 each and the ante is $20. Some of the nice features include the ability to cut the deck, an entertaining animated shuffle and a fine, hi-res shape table for the cards, designed by Bill DePew. *Draw Poker* is a fast-moving, amusing simulation which makes a good introductory level poker teacher.

Apple 21

DePew is the author of another Softape game, *Apple 21*, which realistically recreates blackjack as played in the casinos. As many as three players can challenge the computer dealer. The play begins with the ominous announcement that you are "tapped out."

The computer offers a loan of up to $1000. It was only after reminding myself that my Apple II wouldn't be sending someone around to break my arm if I lost it all that I was able to take the money and get on with the game.

In the computer "shoe" there is only one deck. It appears that the trigger for a reshuffle is the playing of the fourth ace. Once that ace appears there is a new shuffle, even if there is a hand in progress.

creative computing
SOFTWARE PROFILE

Name: Apple 21
Type: Gambling simulation
System: 48K Apple II, disk drive
Format: Disk
Language: Machine language
Summary: Good blackjack game
Price: $24.95
Manufacturer:
Softape
10432 Burbank Blvd.
North Hollywood, CA 91601

Brian J. Murphy, 133 Post Road, Fairfield, CT 06430.

294 K Bytes Out of your Apple!

\$550.00
Single Disk-147 K Bytes

\$950.00
Dual Disk-294 K Bytes

The Synetix Industries' SSD Solid State Disk Emulator provides complete Plug In emulation of either a Single (147 K Byte) or Dual (294 K Byte) Disk Drive. The memory board will operate in any slot 1 through 7. Total software compatability is maintained for *APPLE DOS 3.3, APPLE PASCAL *CP/M. Up to seven SSD's may be used depending on other peripheral equipment in use.

- ☐ Software compatible with *APPLE DOS 3.3, *PASCAL, & *CP/M operating systems
- ☐ Automatic copying of Disks into SSD Memory
- ☐ Single Drive 147 K Byte
- ☐ Dual Drive 294 K Byte
- ☐ Increase speed up to 1000%
- ☐ Add up to 2 Megabytes of Solid State Memory to the APPLE
- ☐ Operates in any I/O slot 1 through 7
- ☐ Increase reliability by reducing mechanical disk drive failures
- ☐ Requires no external power or modifications to the APPLE
- ☐ Price competitive with mechanical drives
- ☐ Reduces space requirements

Micro Computer
Product Marketing
Synetix Industries, Inc.
15050 NE 95th St., Redmond, WA 98052
206-885-4215

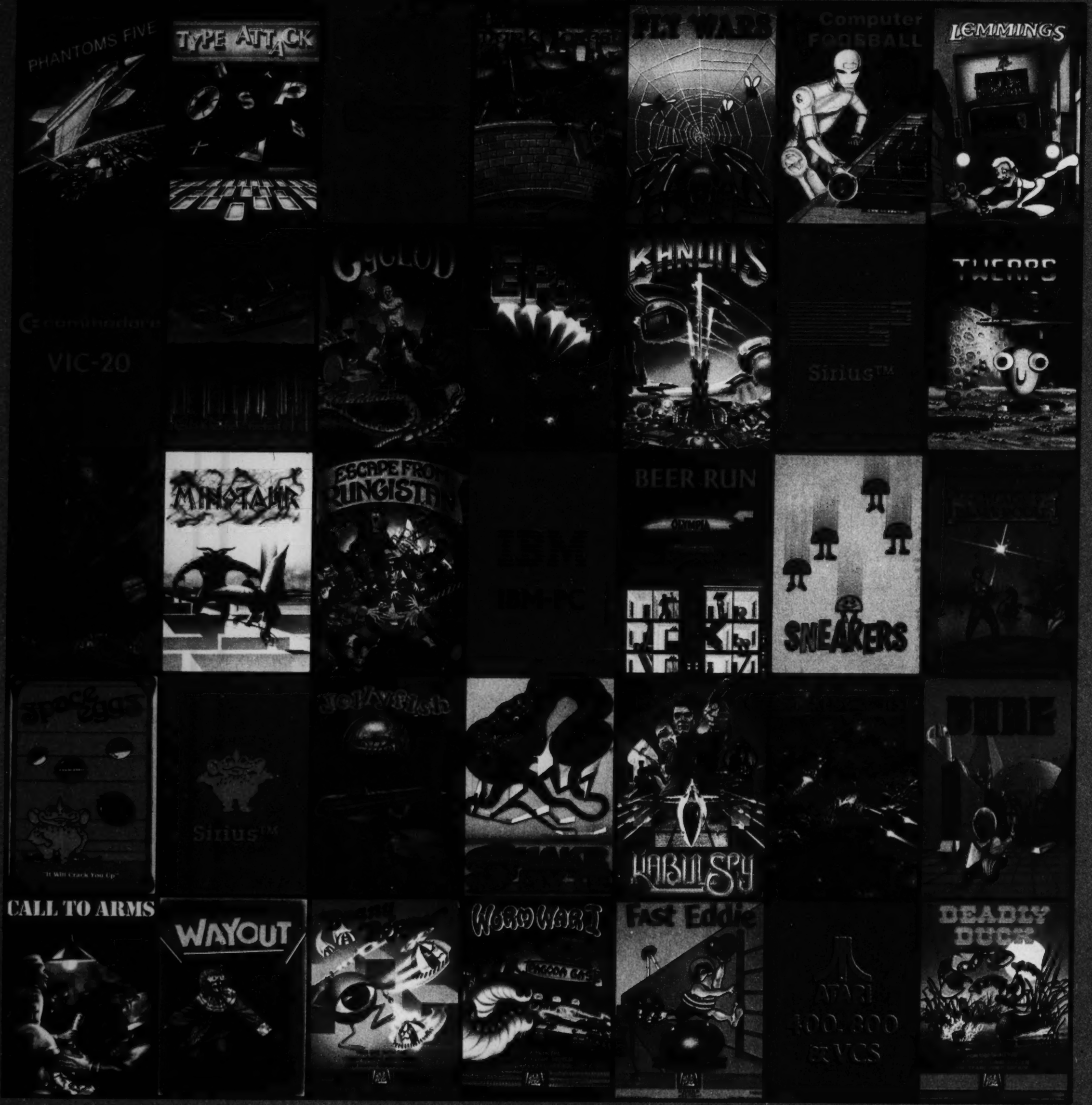
Creative Products by Synetix

Call Toll Free 1-800-426-7412

*Apple and Apple II are trademarks of Apple Computer. CP/M is a trademark of Digital Research

CIRCLE 299 ON READER SERVICE CARD

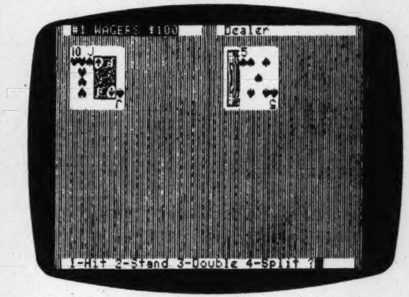
Sirius™ All Star Games


PHANTOMS FIVE
TYPE ATTACK
FLY WARS
Computer FOOSBALL
LEMMINGS
Commodore
VIC-20
CYCLOD
BANDITS
Sirius™
TWERPS
MINOTAUR
ESCAPE FROM RUNGISTAN
IBM
IBM-PC
BEER RUN
SNEAKERS
"It Will Crack You Up"
Sirius™
KABUL SPY
CALL TO ARMS
WAYOUT
Fast Eddie
ATARI
400/800
& VCS
DEADLY DUCK

SUPER FUN!

All software represented in this advertisement are copyrighted products of Sirius Software, Inc., 10364 Rockingham Drive, Sacramento, California 95827, (916) 366-1195. All rights reserved. Apple is a trademark of Apple Computer Inc. Atari is a trademark of Atari Inc. IBM is a trademark of International Business Machines Corp. VIC-20 is a trademark of Commodore Business Machines, Inc. Games of the Century is a trademark of Fox Video Games, Inc.

CIRCLE 274 ON READER SERVICE CARD



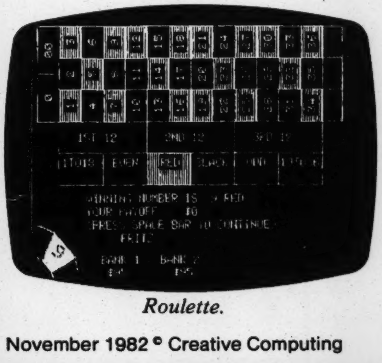
Apple 21.

Play is much the same as in the casinos. The dealer will hit on 16 and stand on 17. If the dealer's first card showing is an ace, you can buy "insurance." No running total of the players' card counts is kept on screen; that computing must be done via biological processing, but it's good practice for real life. Play is swift and exciting. The only drawback to the game, so far as I can detect, is that there is only one deck in play. This means the program does not provide the kind of experience aspiring card counters, who face three or five decks in the shoe at a real casino, would probably like. Of course there is a bright side: unlike a real casino, which will give you the bum's rush if they think you are counting, the Apple II doesn't seem to mind at all.

Roulette and Casino Craps

Roulette and *Casino Craps*, designed in 1979 by Roger Walker, are highly detailed and true to life simulations of the real thing. As in the actual casino games, there is very little strategy involved. What you need most to win is ESP.

In *Roulette* one or two players can challenge the computer "house." Each player starts with a $100 bankroll and can bet as much as $9. Using the Apple II arrow keys or a Softape light pen, you can place bets on any of 162 locations on the hi-res color playfield.



Roulette.

The rest of the game, of course, is sheer chance. The wheel spins and, depending on your gift for prophecy, you profit or crawl deeper into the hole. That is just one aspect of the realism of this game. With all the casino betting options available, even "system" players will find *Roulette* a good simulation of the real thing.

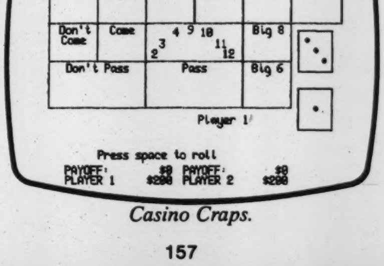
creative computing
SOFTWARE PROFILE

Name: Roulette
Type: Gambling simulation
System: 48K Apple II, disk drive, optional light pen
Format: Disk
Language: Machine language
Summary: Realistic roulette game
Price: $24.95
Manufacturer:
Softape
10432 Burbank Blvd.
North Hollywood, CA 91601

There is at least one heavy-hitting player who won't go to Vegas without his Apple II.

Casino Craps offers the same high level of detailed realism. All of the usual casino betting options are available for the player to choose, using the keyboard arrows or a light pen.

The one important area in which the program falters is its lack of documentation. For a beginner in the great game of craps there are no rules or instructions in print or on the screen.



Casino Craps.

creative computing
SOFTWARE PROFILE

Name: Casino Craps
Type: Gambling simulation
System: 48K Apple II, disk drive, optional light pen
Format: Disk
Language: Machine language
Summary: Realistic casino crap game
Price: $24.95
Manufacturer:
Softape
10432 Burbank Blvd.
North Hollywood, CA 91601

You must read Hoyle or Scarne for the rules and use your own common sense to figure out how to play the game. Once you get the hang of it the game moves along quickly like real crap shooting.

The realism of *Roulette* and *Casino Craps* is so great that, according to a source at Softape, there is at least one heavy-hitting player who won't go to Vegas without his Apple II and disk drive so he can play the games and keep sharp between sessions at the *real* tables.

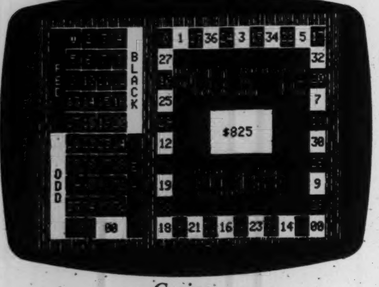
Casino

The level of realism is not as high in Bob Rosen's *Casino*, published in 1981 by Datamost. Five games are offered, keno, poker, blackjack, roulette and baccarat.

Of the five, the best simulation is the blackjack game, which plays as smoothly as *Apple 21* although the hi-res graphics are not as attractive. The action moves swiftly and there is the added aid of a running count of your cards and the dealer's, to help speed up decision-making. The drawback, as with the other programs on this disk, is that the game is solitaire against the computer, making this program less of a party attraction than *Apple 21* and the other Softape casino games.

Keno is a pick the numbers game in which you have the opportunity to choose as many as 15 of 80 available numbers. The computer picks 20. What you win (or lose) depends on how many of the picks coincide. This action moves right along as does your bankroll in an outward bound direction.

Casino, continued...



Casino.

The roulette game is a little more exciting. The choices for betting are more limited than in the Softape version, but the action is a little faster and there is an added element of entertainment in the "roulette square" feature, in which suspense is heightened by a little cursor which spins around the square until, gradually slowing, it comes to rest on a number. This feature enlivens the game greatly and adds a touch of realism missing from the otherwise more sophisticated Softape game.

Realism is not the strong suit in the poker scenario. The screen shows five cards and the payoff begins with a pair of jacks or better. There is no strategy, other than choosing which three cards to discard, and no skill required, other than the ability to foretell the future. The game does move quickly, however, and players of slot machines may find it quite appealing.

Baccarat, the final scenario, requires even less skill than poker. The only decision you make is how much to bet. Once you have entered that information, the computer does the rest while you passively watch the fall of the cards.

creative computing
SOFTWARE PROFILE

Name: Casino

Type: Gambling simulation

System: 16K Apple II, disk drive, Applesoft

Format: Disk

Language: Applesoft

Summary: Five entertaining casino games

Price: $39.95

Manufacturer:
Datamost
9748 Cozycroft Ave.
Chatsworth, CA 91311

Casino has several nice features which help to emphasize the entertainment value of the programs. There is abundant use of music, which you have the option of turning off if you like, and a "stats" option which lets you see how well you are doing vis-a-vis other players. Your bankroll (you start with $1000) at the end of the game is recorded on the disk and if you take up the game at a later date you can, if you use the same name, start just as deeply in the hole as when you quit.

In all, Softape has the edge on realism. *Roulette* and *Casino Craps* are very detailed, realistic simulations but their entertainment value is not as high as *Apple 21* or *Draw Poker,* which is the best game of all the ones we have seen.

Casino is a good entertainment package, though with the exception of the blackjack scenario, it is not as realistic as the Softape games. All the games seem best suited for players with a prior interest in gambling. That audience should find these programs very satisfactory.

For beginning gamblers they offer a painless and relatively cheap introduction to games of chance and an opportunity to sharpen basic skills and to be reminded how stacked the odds are against anyone who gambles for real. ☐

Our Name Means a Great Deal

NEC

PC-6000
NEW!
Please call for details.

PC-8001A Microcomputer (32K)	CALL
PC-8031A Dual mini-disk drives	CALL
PC-8012A I/O unit, 32K, 7 slots	489^{00}
NEC 8023 Printer	489^{00}
32K Memory Add-on card	179^{00}
RenTec RS-232 card for NEC	155^{00}
RenTec Wedge Expansion w/32K	489^{00}

NEC SOFTWARE

NEC CP/M Operating System	125^{00}
General Accounting System	249^{00}
Accounts Receivable System	249^{00}
Inventory Control System	249^{00}
Payroll System	249^{00}
Job Cost System	249^{00}
Select Word Processing w/Speller	349^{00}
Report Manager	149^{00}
Games Pack 1 Alien, Space War	29^{00}
Games Pack 2 UFO Galaxian, Bomber	29^{00}
Wordstar by Micropro	299^{00}
Datastar by Micropro	249^{00}
Mailmerge for NEC Wordstar	109^{00}
Supersort by Micropro	169^{00}
Racet NECDOS	CALL

More software and accessories everyday.

NEW
SANYO
computer
Please call for details.

Best terminal prices on. . .
ADDS
TeleVideo

commodore

We are a full-line Commodore Dealer.
Please Call for More Information

IBM COMPATIBLE ACCESSORIES

64K memory card by microsoft	379^{00}
128K memory card by "	499^{00}
192K memory card by "	659^{00}
256K memory card by "	799^{00}
64K ram chip upgrade kit	169^{00}
Serial Async. Comm. card w/1 port	129^{00}
Serial Async. card with 2 ports	249^{00}
Clock Calendar card	105^{00}
Combo Card by Apparat	235^{00}
Joystick for IBM	55^{00}
Expansion Chassis	CALL
Baby Blue Z-80 w/64K & CP/M	CALL
Percom mini-floppy drives (add-on)	CALL
Tandon TM 100 mini-floppy drives	CALL

FRANKLIN

THE FRANKLIN ACE FEATURES

- Apple II Compatible
- 64K RAM User memory
- Upper and lower case
- Typewriter style keyboard
- Twelve key numeric pad
- Alpha lock shift key
- VisiCalc friendly
- 50 watt power supply
- Built in Fan

Please call or write for more details.

BASIS

The BASIS 108 microcomputer features include both a Z-80 and 6502 processor. RAM capacity of 128K, 80 columns, upper/lower case, detachable keyboard, function keys, numeric keypad, and cursor block. It is completely compatible with all APPLE II hardware peripherals and software, along with being compatible with all CP/M based software.

PLEASE CALL US FOR MORE DETAILS

APPLE II COMPATIBLE Accessories

Prometheus VersaCard	219^{00}
CPS Multi-Function card	169^{00}
Hayes Micromodem II	289^{00}
Hayes Smartmodem	245^{00}
Novation Apple Cat modem	319^{00}
Videx VideoTerm 80 column card	245^{00}
Z-80 SoftCard by Microsoft	289^{00}
16K RamCard by Microsoft	155^{00}
ThunderClock/Calendar card	119^{00}
ALF 9 voice Music Card	149^{00}
Music System (16 voices) Mountain	299^{00}
Asychronous Serial card by CCS	139^{00}
Grappler Printer Interfaces	139^{00}

APPLE II COMPATIBLE DISK DRIVES

A2 with controller	469^{00}
A2 w/o controller	399^{00}
A40 with controller	479^{00}
A40 without controller	389^{00}
A70 with controller	599^{00}
A70 without controller	499^{00}

SOFTWARE

VisiCalc	185^{00}
VisiFile (Data Base Manager)	185^{00}
VisiTrend/VisiPlot	199^{00}
VisiSchedule (New!)	239^{00}
VisiTerm	89^{00}
Tax Preparer by Howard Soft	119^{00}
Real Estate Analyzer by "	119^{00}
PFS: Personal Filing System	79^{00}
DB Master	165^{00}
Peachtree Accounting Software*	CALL
Continental Accounting Pkgs	199^{00}
WordStar by MicroPro*	199^{00}

Microsoft Software; we carry it all!
*Requires a Z-80 Soft-Card

16K RamBoard
FOR APPLE II
$50.00 KIT
ASSEMBLED & TESTED $69.00

VIC-20

The Friendly Computer

$239

VIC 1540 Single Disk Drive	469^{00}
Datasette Cassette I/O unit	65^{00}
Joystick Controller (pair)	20^{00}
VIC 1515 Graphic Printer	329^{00}
VIC Super Expander	54^{00}
8K Ram Cartridge	49^{50}
16K Ram Cartridge	99^{00}
VIC RS-232C Terminal interface	39^{00}
ViCalc - Viable Calculator (T)	11^{00}
AMOK (C)	31^{00}
The Alien (8K/T)	19^{00}

MONITORS

Amdek Video 300 12" Hi-Res Green	169^{00}
Amdek Color I 13" Color w/audio	379^{00}
Amdek Color II Hi-Res RGB	769^{00}
Amdek Apple II DVM RGB card	169^{00}
NEC 12" Hi-Res Green monitor	169^{00}
NEC 12" Composite Color	349^{00}
NEC 12" Hi-Res RGB Color	799^{00}
Sanyo 9" Green monitor	179^{00}
Sanyo 12" B&W	189^{00}
Sanyo 13" Color Monitor	369^{00}
Zenith 12" Green monitor	119^{00}

ATARI

Atari 800 (16K)	679^{00}
Atari 800 w/32K 729^{00} w/48K	769^{00}
Atari 400 (16K)	329^{00}
Bit 3 80 Column Card for 800	299^{00}
410 Program Recorder	79^{00}
810 Disk Drive	439^{00}
850 Interface Module	169^{00}
Atari Joysticks (pair)	20^{00}
Axlon Ramcram 32K module	149^{00}
Atari 16K Module by Microteck	69^{00}
EDU-PAKs Educational Tape Series	CALL
Pac-Man (cartridge)	34^{50}
Centipede (cartridge)	34^{50}

We carry all ATARI software and hardware.

PRINTERS

C. Itoh F-10 40 CPS (parallel)	1399^{00}
C. Itoh F-10 40 CPS (serial)	1450^{00}
Epson MX-80 T Type III w/graph	CALL
Epson MX-80 F/T Type III w/graph	CALL
Epson MX-82 F/T Type III w/graph	CALL
IDS Prism 132 with color	1589^{00}
NEC Spinwriters (most models)	CALL
NEC 8032 Impact Dot Matrix	489^{00}
Okidata 82A w/tractor, 80 col	469^{00}
Okidata 83A's & 84A's	CALL
Smith Corona Printer parallel	689^{00}

DISKETTES

Dysan 5¼" (Soft, 10 or 16 sectored)	$10/39^{50}$
Verbatim 5¼" (Soft 10 or 16 sect.)	$10/29^{50}$
Scotch 3M 5¼" (Soft, 10 or 16 sect.)	$10/26^{50}$
Same as above in quantity of 100	245^{00}
Scotch 3M Dr. Head Clean. Kit (5" & 8")	29^{00}

consumer computers
CATALOG SALES
8338 Center Drive La Mesa, CA 92041
Toll Free 800-854-6654
Info & California 714 - 698-8088

We accept most major credit cards, bank wire transfer, money orders, cashiers or certified checks and personal checks (10 days to clear). Unless prepaid with cash please add 5% shipping, handling and insurance (min. $5.00). CA residents add 6% sales tax. Foreign customers please call for ordering information. All equipment is subject to price change and availability without notice. All equipment is new and complete with manufacturer's warranty. We have a 15 day satisfaction policy — call for details.

CIRCLE 154 ON READER SERVICE CARD

THE LINE IS RAPIDFIRE.
THE GAME IS....
CYTRON MASTERS
RapidFire

SIZZLING

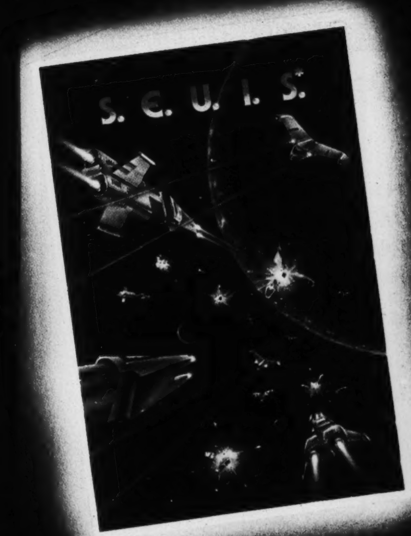
HOT &

COMING

AT YOU!

Galactic Gladiators

RapidFire
GAMES FROM SSI

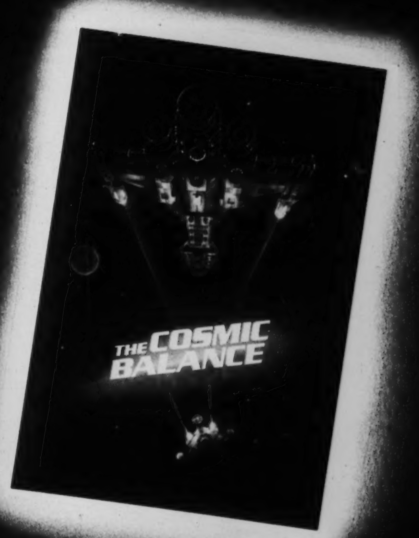


FUN.

FAST.

POWERFUL.

EXCITING.


THE COSMIC BALANCE

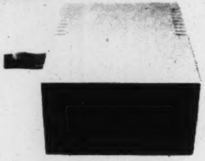
LOOK FOR THEM AT YOUR LOCAL COMPUTER/GAME STORE!

If there are no convenient stores near you, VISA and M/C holders can order direct by calling 800-227-1617, ext. 335 (toll free). In California, call 800-772-3545, ext. 335. To order by mail, send your check to: Strategic Simulations Inc, [illegible] Suite 108, Mountain View, [illegible] California residents, add 6½% sales tax. [illegible] is $39.95.

CIRCLE 291 ON READER SERVICE CARD

ALL MERCHANDISE 100% GUARANTEED! CALL US FOR VOLUME QUOTES

APPLE* II COMPUTER USERS
DISK DRIVE $\$299^{95}$



- ★ Includes metal cabinet
- ★ Color matches Apple
- ★ 35 Tracks/single side
- ★ Includes cable
- ★ Use with Apple II Controller

16K RAM CARD $\$69^{95}$

- ★ Upgrade your 48K Apple II to full 64K of RAM.
- ★ Fully software and hardware compatible with the Apple language card and microsoft Z80 card.
- ★ Eliminates the need for the Applesoft or Integer Basic ROM card when used in conjunction with DOS 3.3.
- ★ Allows you to run Apple Fortran or Pascal with no difficulty.
- ★ Available as bare board, kit, or assembled and tested board.

BARE PC CARD — $28.00 KIT — $59.95

COOLING FAN $\$69^{95}$

- ★ Easy installation.
- ★ No modification of Apple required.
- ★ Color matches Apple.
- ★ Switch on front controls fan, computer and monitor.
- ★ Ultra-quiet, reliable fan.
- ★ Completely eliminates problems caused by overheating.

*Apple is a trademark of APPLE COMPUTER, INC.

EPSON PRINTERS

MX-80
MX-80FT
MX-100

CALL FOR PRICE

WE HAVE APPLE AND TRS-80 INTERFACE CARDS AND CABLES

MONITORS

NEC	JB-1201 M	$\$169^{00}$
ZENITH	ZVM-121	$\$119^{95}$

ORDER TOLL FREE
800-538-5000
800-662-6279
(CALIFORNIA RESIDENTS)

IF YOU CAN FIND A PRICE LOWER ELSEWHERE, LET US KNOW AND WE'LL MEET OR BEAT THEIR PRICE!

EXPAND YOUR MEMORY
16 DYNAMIC RAMS

SET OF 8 PCS.
4116-200NS RAMS $\$13^{95}$

INSTRUCTIONS FOR
Model I
Model III
Color Computer to 16K
Color Computer to 32K
$\$1^{00}$ **EACH**

DIP SHUNTS
FOR TRS-80
MODEL I
KEYBOARD
SET OF 2
$\$2^{95}$

DISKETTES

5¼"

ATHANA SS SD SOFT	24.95
MEMOREX SS SD SOFT	26.95
VERBATIM SS SD SOFT	29.95
VERBATIM 10 SECTION HARD	29.95

8"

VERBATIM SS SD SOFT	44.95

JDR MICRODEVICES, INC.

1224 S. Bascom Avenue
San Jose, CA 95128
800-538-5000 • 800-662-6279 (CA)
(408) 995-5430 • Telex 171-110

© 1982 JDR MICRODEVICES, INC.

VISIT OUR RETAIL STORE

HOURS:
M-F, 9-5; Sat. 11-3

PLEASE USE YOUR CUSTOMER NUMBER WHEN ORDERING

TERMS: For shipping include $2 for UPS Ground or $3 for UPS Blue Label Air. Items over 5 pounds require additional shipping charges. Foreign orders, include sufficient amount for shipping. There is a $10 minimum order. Bay Area and Los Angeles Counties add 6½% Sales Tax. Other California residents add 6% Sales Tax. We reserve the right to substitute manufacturer. Not responsible for typographical errors. Prices are subject to change without notice. We will match or beat any competitor's price provided it is not below our cost.

CIRCLE 195 ON READER SERVICE CARD

Colorsoft Flight Simulator

Any Landing You Can Walk Away From Is OK

Scott L. Norman

creative computing

SOFTWARE PROFILE

Name: Colorsoft Flight Simulator
Type: One-player simulation
System: 16K or 32K TRS-80, Color Computer with joysticks
Format: Cassette
Language: Extended Color Basic
Summary: For aviation fanatics only
Price: $11.95
Manufacturer:
Color Software Services
P.O. Box 1723
Greenville, TX 75401

I'm nuts about airplanes. Always have been. I am also interested in making the most of the considerable graphics capabilities of my TRS-80 Color Computer. That is why, ever since I acquired my machine, I have been eagerly anticipating a really terrific aircraft simulation game—one with a decent instrument panel, coupled with an interesting out-of-the-cockpit view.

The view could be of a carrier, an airborne tanker, or enemy aircraft, if it were a war game, if it were a commercial aviation game, then it could be a view of a runway layout during a landing approach.

I'm still waiting. *Flight Simulator* isn't it. *Flight Simulator* is a representation of an instrument approach to an airport, all right, but the "instrument panel" consists of six little text boxes, and there is no view out of the cockpit—not even a representation of the cockpit.

It is actually quite dumb. The only thing is, you can crank up the degree of difficulty and give yourself a pretty fair workout, because after all you are trying to manage motion in three dimensions.

Your control of the aircraft is limited to climbing, diving, and banking via commands from a single joystick.

It can become something of a challenge to monitor the few "instructions," too, because the layout of the panel is screwed up. Then there is the matter of the response of the aircraft.

This is no F-15 you've got on your hands. It staggers through turns like a drunk finding his way out of the House of Mirrors, it drops alarmingly from high altitudes, and it floats when you want to lose the last few hundred feet before landing. I don't know what kind of aircraft it is supposed to simulate; I don't know if it obeys any control laws at all. Maddening.

Surprisingly, it isn't all bad, however. Let me describe the game, and let you decide for yourself. In *Flight Simulator*, the single player is first asked to specify an altitude and distance within which he must approach the airport in order to win. Both figures must be given in miles, although the altimeter readout on the panel is in feet as it should be. You can start with nice fat tolerances (up to 10 miles for an altitude specification, for instance!), but with a little practice you can be shooting for realistic goals. It is fairly reasonable to specify 0.1 miles for both dimensions; an altitude spec of 0.05 miles makes things a little dicey. After setting up your degree of difficulty in this fashion, you are presented with your instrument panel view, and the game begins.

The panel consists of three rows of data. The uppermost one gives you altitude and airspeed data and the compass heading; the next row gives the distance to the airport and something else, also called "heading," which is really the bearing to the airport from your Present Position. The third row consists of a fuel gauge.

The information is updated every two seconds. (The game is written in Basic, remember?) Your control of the aircraft

---

Scott L. Norman, 8 Doris Rd., Framingham, MA 01701.

FOR TRS-80 MODEL I OR III
IBM PERSONAL COMPUTER

- ★ **MORE SPEED**
  10-20 times faster than interpreted BASIC.
- ★ **MORE ROOM**
  Very compact compiled code plus VIRTUAL MEMORY makes your RAM act larger. Variable number of block buffers. 31-char.-unique wordnames use only 4 bytes in header!
- ★ **MORE INSTRUCTIONS**
  Add YOUR commands to its 79-STANDARD-plus instruction set!
  Far more complete than most Forths: single & double precision, arrays, string-handling, clock, graphics (IBM low-res. gives B/W and 16 color or 200 tint color display).
- ★ **MORE EASE**
  Excellent full-screen Editor, structured & modular programming
  Word search utility
  THE NOTEPAD letter writer
  Optimized for your TRS-80 or IBM with keyboard repeats, upper/lower case display driver, full ASCII.
- ★ **MORE POWER**
  Forth operating system
  Concurrent Interpreter AND Compiler
  VIRTUAL I/O for video and printer, disk and tape
  (10-Megabyte hard disk available)
  Full 8080 or 8088 Assembler aboard
  (Z80 Assembler also available for TRS-80)
  Intermix 35- to 80-track disk drives
  IBM can read, write and run M.3 Disks
  M.3 can read, write and run M.1 disks

mmsFORTH

THE PROFESSIONAL FORTH SYSTEM
FOR TRS-80 & IBM PC

(Thousands of systems in use)

MMSFORTH Disk System (requires 1 disk drive, 32K RAM)
V2.0 For Radio Shack TRS-80 Model I or III $129.95*
V2.1 For IBM Personal Computer (80-col. screen) $249.95*

AND MMS GIVES IT PROFESSIONAL SUPPORT

Source code provided
MMSFORTH Newsletter
Many demo programs aboard
MMSFORTH User Groups
Inexpensive upgrades to latest version
Programming staff can provide advice, modifications and custom programs, to fit YOUR needs.

MMSFORTH UTILITIES DISKETTE: includes FLOATING POINT MATH (BASIC ROM routines plus Complex numbers, Rectangular-Polar coordinate conversions, Degrees mode, more); a powerful CROSS-REFERENCER to list Forth words by block and line; plus (TRS-80) a full Forth-style Z80 assembler requires MMSFORTH V2.0, 1 drive & 32K RAM) $39.95*

FORTHCOM: communications package provides RS-232 driver, dumb terminal mode, transfer of FORTH blocks, and host mode to operate a remote FORTHCOM systems (requires MMSFORTH V2.0, 1 drive & 32K RAM) $39.95*

THE DATAHANDLER: a very fast database management system operable by non-programmers (requires MMSFORTH V2.0, 1 drive & 32K RAM) $59.95*

FORTHWRITE: fast, powerful Word Processor w/easy keystrokes, Help screens, manual & demo files. Full proportional w/tabs, outdenting. Include other blocks, documents & keyboard inputs— ideal for form letters (requires MMSFORTH V2.0, 2 drives & 48K RAM) $175.00*

MMSFORTH GAMES DISKETTE: real-time graphics & board games w/source code. Includes BREAKFORTH, CRASHFORTH, CRYPTOQUOTE, FREEWAY (TRS-80), OTHELLO & TICTACFORTH (requires MMSFORTH V2.0, 1 drive & 32K RAM) $39.95*

Other MMSFORTH products under development

FORTH BOOKS AVAILABLE

MMSFORTH USERS MANUAL - w/o Appendices $17.50*
STARTING FORTH - best! $15.95*
THREADED INTERPRETIVE LANGUAGES - advanced, analysis of FORTH internals $18.95*
PROGRAM DESIGN & CONSTRUCTION - intro. to structured programming, good for Forth $16.00*
FORTH-79 STANDARD MANUAL - official reference to 79-STANDARD word set, etc $13.95*
FORTH SPECIAL ISSUE, BYTE Magazine (Aug. 1980) - A collector's item for Forth users and beginners $4.00*

ORDERING INFORMATION: Software prices include manuals and require signing of a single computer license for one-person support. Describe your Hardware. Add $2.00 S/H plus $3.00 per MMSFORTH and $1.00 per additional book; Mass. orders add 5% tax. Foreign orders add 20%. UPS COD, VISA and M/C accepted; no unpaid purchase orders or refunds.

Send SASE for free MMSFORTH information
Good dealers sought

Get MMSFORTH products from your
computer dealer or

MILLER MICROCOMPUTER
SERVICES (B9)
61 Lake Shore Road, Natick, MA 01760
(617) 653-6136

CIRCLE 225 ON READER SERVICE CARD

Landing, continued...

is limited to climbing, diving, and banking via commands from a single joystick. Airspeed is controlled by the computer, and is reduced in two stages as you approach the airport.

All games begin with the aircraft at 30,000 feet and 220 mph, on a course of 270 degrees (due west). The airport is 300 miles to the north, and your fuel load is 10,000 lbs. (that's the way jets specify it, sport). Now things get a little complicated.

Your two-second updates actually represent a minute's flying time each at this stage, which makes the sluggish response of the plane even stranger. At any rate, your first task is to turn onto a course which will point you toward the airport. The quickest route is to execute a right turn through a little more than 90 degrees, which can be done with a fuel expenditure of about 2500 lbs. You can also go around the long way, turning left for about 270 degrees. This will still leave you with enough fuel, if you are careful.

You should also begin your descent during the turn. Part of the fun is experimenting with rates of descent during these early phases so as to leave yourself in a comfortable position for the rest of the flight. After all, you come out of your turn more than 200 miles from the airport, in general, and you don't want to fly it all at 500 feet.

Once you have established your initial course for the airport, you must continue to manage your altitude and correct any heading deviations that may occur. Occur they will, too. You will generally be unable to roll out of that first big turn right on the money, thanks to the control characteristics of the program, so you can expect to see the heading of the aircraft and the bearing to the airport diverge as the flight progresses. With experience, you develop a sense of which way to nudge the joystick to respond to such changes.

When you get to within 100 miles of the airport, airspeed is reduced to 180 mph. At the same time, the simulation rules are changed so that each instrument update represents 30 seconds of flight time.

Things change again when you are 20 miles out; airspeed goes down to 100 mph, while the simulated interval diminishes to 7 seconds. All of this is accompanied by additional audio tones at the two-second update intervals, together with some malarkey on the screen about being cleared to land on Runway 123.

Ignore the latter. Real runways are designated by a system related to their compass headings, and in this game the direction in which you finally approach the airport doesn't matter; only the distance and altitude count.

All of these changes in simulated time intervals make it difficult to develop a real feel for the flying characteristics of the aircraft, as I have stressed. The upshot is that in the latter stages of an approach, you must pay a penalty for any earlier mismanagement of the descent.

It is very common to find yourself closing rapidly on the airport with more altitude than you can shed, even with full forward stick.

Your only alternative at such moments is to overfly and go out on some course from which you can descend to a more appropriate altitude. The trick is to manage things so that you can later turn back onto a direct course for the airport. You need a lot of room in which to turn around, which means that it is necessary to go a good way past the airport before beginning your turn. Otherwise, you can find yourself orbiting the field, unable to ever get onto a direct radial bearing.

Nothing lasts forever, though, and your troubles will be over when you run out of either fuel or altitude (in contrast to the airman's classic trilogy of "airspeed, altitude, and ideas"). By the way, a crash for either reason is signified by a really annoying little tune.

That's really all there is to it. I must admit that successful "landings" came as a shock for a while, because they usually occurred while I was concentrating very hard on simultaneously maintaining a finite altitude and a small course deviation. *Flight Simulator* rarely gives you the luxury of flaring out for a proper landing.

So what's in it for the player? Not much, by objective standards. There are no graphics, you have no control over certain important parameters (ground-controlled airspeed?), and in my opinion the simulation as a whole is clumsy.

Of course, since it is in Basic the enterprising enthusiast could use it as the jumping-off point for his own game, but that's not much of a recommendation. I can't even say whether I would play it at all, if the numbers didn't purport to relate to an airplane.

Still, there is a certain satisfaction to be gained from flying a good pattern and glide path, even if there are no rewards within the game itself. In the end, such internal rewards are probably what attract people to any computer game. What can I say?

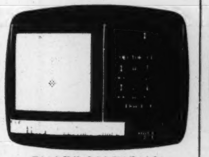
Buy *Flight Simulator* if you are an aviation nut, and join me in hoping for a really good simulation. Who knows, maybe the people at Color Software Services will be able to improve this one dramatically.

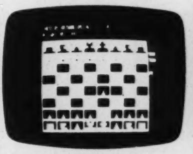
And if you do rework it, try to remember that any aircraft with a fuel load measured in pounds ought to have its airspeed measured in knots. ☐

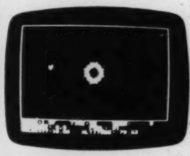
CIRCLE 347 ON READER SERVICE CARD

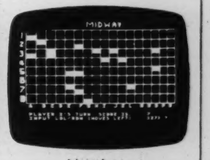
It's hard to picture all of DYNACOMP's *software*

GIN RUMMY

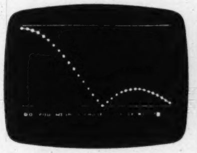

SHAPE MAGICIAN


CHESSMASTER

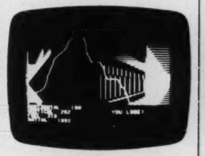

BLACK HOLE



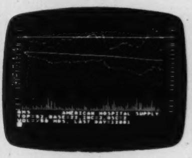
MIDWAY

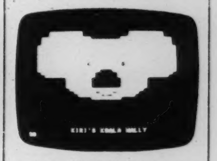

FOURIER ANALYZER

RINGS OF THE EMPIRE

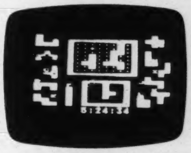


LEM LANDER

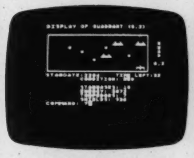

AMERICAN HOSPITAL SUPPLY
STOCKAID

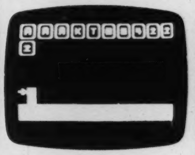

KIKI'S KOALA WALLY
HODGE PODGE

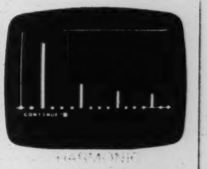
FIRE SCANNER
FOREST FIRE

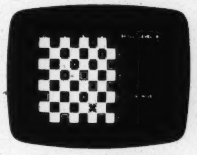


QUINTOMINOES

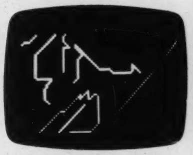

STARBASE 3.2

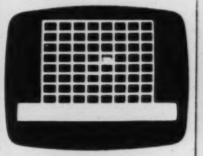

GO FISH

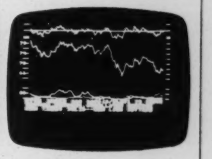

HARMONIC ANALYZER


CHECKERS 3.0

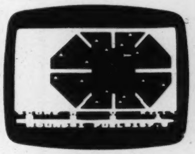
DO RE MI FA SO LA TI DO
HODGE PODGE

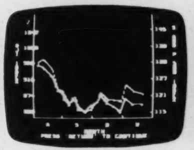

TRIPLE BLOCKADE


CHOMPELO

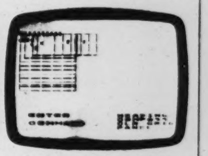

NYINDEX

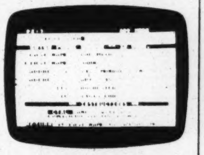
607
× 422
1214
1214
2428
256154
TEACHER'S AIDE


SPACE TRAP


STOCK MASTER
STOCK PLOT

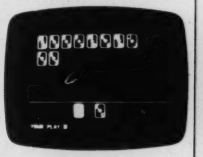
#1 $382
#2 $445
#3 $445
#4 $1000
BACCARAT


SUPER SUB CHASE


MAIL MASTER

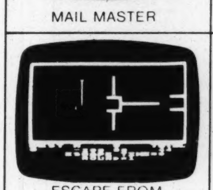
VALDEZ (MAP)

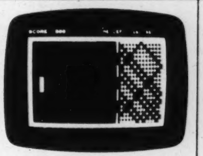
STOCK MASTER
STOCK PLOT

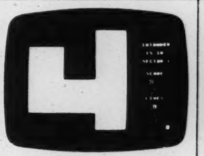


GIN RUMMY

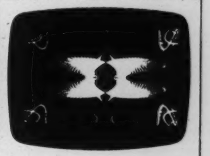
TRADE ROUTE MAP
ABCDEFGHIJKLMNOPQR
PRESS TO CONTINUE
SPACE LANES


ESCAPE FROM
VOLANTIUM


BREAKUP


INTRUDER ALERT

DYNACOMP P.F.S.
DISK DIRECTORY
PERSONAL FINANCE
SYSTEM


CRYSTALS

TURN TO NEXT PAGE....

(c) 1982 PROMEDIA ASSOCIATES

DYNACOMP

Quality software for:*

APPLE II Plus
OSBORNE-1
NORTH STAR***
ATARI
PET/CBM
ALTAIR****
NEC PC-8000
TRS-80 (Level II)**
SUPERBRAIN*****
CP/M Disks/Diskettes
(See Availability box MBASIC/CBASIC)

CARD GAMES

NEW

BRIDGE MASTER (Available for all computers) Price: $21.95 Diskette

If you liked DYNACOMP'S BRIDGE 2.0, you will absolutely love BRIDGE MASTER. BRIDGE MASTER is a comprehensive bridge program designed to provide hours of challenging competition. Bidding features include the Blackwood convention, Stayman convention, pre-emptive openings, and recognition of demand bids and jump-shift responses. After playing a specific hand, you may replay the same hand, with the option of switching cards with your computer opponents. This feature allows you to compare your bidding and playing skills to BRIDGE MASTER. Bonuses for game contracts and slams are awarded as in duplicate bridge. Doubled contracts are scored based upon a computer assigned vulnerability. A score card is displayed at the conclusion of each hand. The score card displays a summary of total hands played, total points scored, number of contracts made and set, and % bids made. BRIDGE MASTER is clearly the best computer bridge program available.

DYNACOMP'S previous BRIDGE 2.0 customers may upgrade to BRIDGEMASTER for a nominal charge of $5.00 plus postage and handling (see ordering information box). Original cassette/diskette must be returned.

BACCARAT (Atari only) Price: $18.95 Cassette/$22.95 Diskette

This is the European card game which is the favorite of the Monte Carlo jet set. Imagine yourself at the gaming table with 007 to your left and Goldfinger to your right. Learn and play BACCARAT at your leisure on the Atari. Contains full high resolution color graphics and matching sound. Runs in 16K. Requires one joystick.

GIN RUMMY (Apple diskette only) Price: $22.95 Diskette

This is the best micro computer implementation of GIN RUMMY existing. The computer plays exceptionally well, and the HIRES graphics are superb. What else can be said?

POKER PARTY (Available for all computers) Price: $19.95 Cassette/$23.95 Diskette

POKER PARTY is a draw poker simulation based on the book, POKER, by Oswald Jacoby. This is the most comprehensive version available for microcomputers. The party consists of yourself and six other (computer) players. Each of these players (you will get to know them) has a different personality in the form of a varying propensity to bluff or fold under pressure. Practice with POKER PARTY before going to that expensive game tonight! Apple cassette and diskette versions require a 32K (or larger) Apple II.

GO FISH (Available for all computers) Price: $14.95 Cassette/$18.95 Diskette

GO FISH is a classic children's card game. The opponent is a friendly computer with user inputs that are simple enough for small children to easily master. The Apple and Atari versions employ high resolution graphics for the display of hands. A must for children! Runs in 16K.

NEW

BLACKJACK COACH (32K TRS-80 only) Price: $29.95 Cassette/$33.95 Diskette

BLACKJACK COACH teaches and evaluates professional playing methods. This program will coach you using the Basic and the Complete Card Counting Methods. The BLACKJACK COACH can be used in automatic, unattended play to test the playing and betting strategies you select. Extensive summary reports pinpoint the strengths and weaknesses of various methods of play. All the standard player choices are included: Insurance, splitting pairs, double downs and surrender (optional). A line printer may be used to collect data. If you risk money at the tables, increase your skills with the BLACKJACK COACH!

THOUGHT PROVOKERS

MANAGEMENT SIMULATOR (Available for all computers) Price: $25.95 Cassette/$29.95 Diskette

This program is both an excellent teaching tool as well as a stimulating intellectual game. Based upon similar games played at graduate business schools, each player or team controls a company which manufacturers three products. Each player attempts to outperform his competitors by setting selling prices, production volumes, marketing and design expenditures etc. The most successful firm is the one with the highest stock price when the simulation ends.

FLIGHT SIMULATOR (Available for all computers) Price: $19.95/Cassette/$23.95 Diskette

A realistic and extensive mathematical simulation of take-off, flight and landing. The program utilizes aerodynamic equations and the characteristics of a real airfoil. You can practice instrument approaches and navigation using radials and compass headings. The more advanced flyer can also perform loops, half-rolls and similar aerobatic maneuvers. Although this program does not employ graphics, it is exciting and very addictive. See the software review in COMPUTRONICS. Runs in 16K Atari.

VALDEZ (Available for all computers) Price: $17.95 Cassette/$21.95 Diskette

VALDEZ is a computer simulation of supertanker navigation in the Prince William Sound/Valdez Narrows region of Alaska. Included in this simulation is a realistic and extensive 256 x 256 element map, portions of which may be viewed using the ship's alphanumeric radar display. The motion of the ship itself is accurately modelled mathematically. The simulation also contains a model for the tidal patterns in the region, as well as other traffic (outgoing tankers and drifting icebergs). Chart your course from the Gulf of Alaska to Valdez Harbor! See the software reviews in 80 Software Critique, Personal Computing and Creative Computing.

BACKGAMMON 2.0 (Available for all computers) Price: $19.95 Cassette/$23.95 Diskette

This program tests your backgammon skills and will also improve your game. A human can compete against a computer or against another human. The computer can even play against itself. Either the human or the computer can double or generate dice rolls. Board positions can be created or saved for replay. BACKGAMMON 2.0 plays in accordance with the official rules of backgammon and is sure to provide many fascinating sessions of backgammon play.

NEW

FROG MASTER (Atari only) Price: $17.95 Cassette/$21.95 Diskette

The Atari APEX first prize winner. FROG MASTER contains exciting arcade features in addition to being a highly educational program. It is a fast-moving high-concentration game for 1-4 players. You score by making touchdowns on the opponents' goal line – if his goalie doesn't get there first. But your players (tadpoles and frogs) must be trained. This is accomplished by giving them a reward at just the right moment when they do something right. This takes precise timing and judgement. Your critters must penetrate barriers and avoid evil line backs if they are to score. Many will fall by the wayside, but some will get through. As they learn you can look inside their heads to see how they think. As you reward them, they reward you (the "thought processes" simulated demonstrate the basic type of animal learning - operant conditioning - widely studied in high school and college courses). As you teach them they teach you how learning takes place! Great graphics! Runs in 16K. Requires two joysticks.

FOREST FIRE! (Atari only) Price: $14.95 Cassette/$18.95 Diskette

Using excellent graphics and sound effects, this simulation puts you in the middle of a forest fire. Your job is to direct operations to put out the fire while compensating for changes in wind, weather and terrain. Not protecting valuable structures can result in startling penalities. Life-like variables are provided to make FOREST FIRE! very suspenseful and challenging. No two games have the same setting and there are 3 levels of difficulty.

CRANSTON MANOR ADVENTURE (North Star, SuperBrain and CP/M only) Price: $19.95 Diskette

At last! A comprehensive Adventure game for North Star and CP/M systems. CRANSTON MANOR ADVENTURE takes you into mysterious CRANSTON MANOR where you attempt to gather fabulous treasures. Lurking in the manor are wild animals and robots who will not give up the treasures without a fight. The number of rooms is greater and the associated descriptions are much more elaborate than the current popular series of Adventure programs, making this game the top in its class. Play can be stopped at any time and the status stored on diskette.

SPACE EVACUATION! (Available for all computers) Price: $15.95 Cassette/$19.95 Diskette

Can you colonize the galaxy and evacuate the Earth before the sun explodes? Your computer becomes the ship's computer as you explore the universe to relocate millions of people. This simulation is particularly interesting as it combines many of the exciting elements of classic space games with the mystery challenge of ADVENTURE. -

MONARCH (Atari only) Price: $14.95 Cassette/$18.95 Diskette

MONARCH is a fascinating economic simulation requiring you to survive an 8-year term as your nation's leader. You determine the amount of acreage devoted to industrial and agricultural use, how much food to distribute to the populace and how much should be spent on pollution control. You will find that all decisions involve a compromise and that it is not easy to make everyone happy. Runs in 16K Atari.

NEW

RUBIK'S CUBE SOLVER (Available for all computers) Price: $14.95 Cassette/$18.95 Diskette/$21.45 Disk

Solving the Rubik's cube puzzle is an exercise in algorithimic logic, and is a "natural" for computer calculation. The RUBIK'S CUBE SOLVER permits you to input the starting state of the 24 facing elements of the cube. It then solves the problem one step at a time, with each step shown as a unfolded view of the cube. Can you solve the cube in fewer steps. In any case, it sure beats disassembling the cube or peeling off and replacing the colors! Requires 16K.

AVAILABILITY

DYNACOMP software is supplied with complete documentation containing clear explanations and examples. Unless otherwise specified, all programs will run within 16K program memory space (ATARI requires 24K). Except where noted, programs are available on ATARI, PET, TRS-80 (Level II), NEC and Apple (Applesoft) cassette and diskette as well as North Star single density (double density compatible) diskette. Additionally, most programs can be obtained on standard (IBM 3740 single density/double density compatible format) 8" CP/M floppy disks for systems running under MBASIC or CBASIC (for example, Altos, Xerox 820, Heath/Zenith and many others). 5¼" CP/M diskettes are available for the North Star, SuperBrain and Osborne computer systems.

**ATARI, PET CBM, NORTH STAR, CP M, IBM, OSBORNE, SUPERBRAIN, NEC PC-8000 and XEROX are registered tradenames and or trademarks.*

***Except where noted, all TRS-80 Model I software is available on cassette (only) for the TRS-80 Model III. Exceptions: VALDEZ, CRIBBAGE, GRAFIX, CHESSMASTER. TRS-80 diskettes are not supplied with either DOS or BASIC.*

****For most North Star disk-based systems.*

*****For Altair systems having Microsoft BASIC.*

******For SUBERBRAIN systems running under MBASIC or CBASIC (state which).*

DYNACOMP OFFERS THE FOLLOWING

- Widest variety
- Guaranteed quality
- Fastest delivery
- Friendly service
- Free catalog*
- Toll free order phone

*$2.00 U.S. funds for foreign mailing.

AND MORE...

STARBASE 3.2 (Available for all computers) Price: $13.95 Cassette/$17.95 Diskette

This is the classic space simulation, but with several new features. For example, the Croylins now shoot at the Invincible without warning while also attacking starbases in other quadrants. The Croylins also attack with both light and heavy cruisers and move when shot at! The situation is hectic when the Invincible is besieged by three heavy cruisers and a starbase S.O.S. is received! The Croylins get even! See the software reviews in A.N.A.L.O.G., 80 Software Critique and Game Merchandising.

LIL' MEN FROM MARS (Atari only) Price: $19.95 Cassette/$23.95 Diskette

Defend yourself! The little men from Mars are out to get you if you don't get them first. This is a hilarious high resolution animated graphics (arcade) game which exercises much of the Atari's power. Requires one joystick.

NEW

ALVIN (Atari only) Price: $17.95 Cassette/$21.95 Diskette

ALVIN is a great arcade game. You are commanding a highly maneuverable ship seeking to destroy several enemy cities. You are attempting to bomb these cities while at the same time trying to avoid their defensive fire (MISSILE COMMAND" in reverse?). Also, your radar has been damaged so that you can only see downwards. This would normally not be much of a problem except that you also have to contend with high-flying enemy aircraft. As long as you are above these aircraft you have the advantage and are safe. However, high level bombing takes considerable skill. Therefore to achieve your goal the best strategy is to swoop down for a bombing run while the enemy craft is out of range, and quickly retreat to the skies. A fun game. Requires 16K.

ESCAPE FROM VOLANTIUM (Atari only) Price: $15.95 Cassette/$19.95 Diskette

Bring the action and excitement of an arcade into your home with ESCAPE FROM VOLANTIUM! To escape you must maneuver your space ship around obstacles and laser blast the guardian (without being eaten). If he is killed with a direct shot (not just a leg lopped off), a door opens to the outside. However, the door does not stay open indefinitely. If you fail to escape in time, the door closes and a new guardian appears. Sometimes you can smash through the door by repeatedly chipping away at it. Other times it is impervious. At the higher levels of play more obstacles and guardians appear, adding to the excitement. Uses high resolution graphics and sound. Runs in 16K.

ALPHA FIGHTER (Atari only) Price: $13.95 Cassette/$17.95 Diskette

Two excellent graphics and action programs in one! ALPHA FIGHTER requires you to destroy the alien starships passing through your sector of the galaxy. ALPHA BASE is in the path of an alien UFO invasion; let five UFO's get by and the game ends. Both games require the joystick and get progressively more difficult the higher you score! ALPHA FIGHTER will run on 16K systems.

THE RINGS OF THE EMPIRE (Atari only) Price: $14.95 Cassette/$18.95 Diskette

The empire has developed a new battle station protected by rotating rings of energy. Each time you blast through the rings and destroy the station, the empire develops a new station with more protective rings. This exciting game runs on 16K systems, employs extensive graphics and sound and can be played by one or two players.

INTRUDER ALERT (Atari only) Price: $15.95 Cassette/$19.95 Diskette

This is a fast paced graphics game which places you in the middle of the "Dreadstar" having just stolen its plans. The droids have been alerted and are directed to destroy you at all costs. You must find and enter your ship to escape with the plans. Five levels of difficulty are provided. INTRUDER ALERT requires a joystick and will run on 16K systems.

MIDWAY (Atari 32K only) Price: $14.95 Cassette/$18.95 Diskette

MIDWAY is an exciting extension of the game of Battleship. It mixes the challenges of strategy and chance. Your opponent can be another human or the computer. Color graphics and sound are both included. Runs in 16K.

NEW

GOLF PRO (Atari only) Price: $17.95 Cassette/$21.95 Diskette

Both realism and beautiful graphics are joined together in GOLF PRO to produce the best golf simulation available. To really appreciate this game, you should have a color TV so that you can see the green of the fairway, the blue of the water hazards, and the white sand of the traps. You tee off with a wood, use your wedge in the sand trap, and putt on the green just as would be done on the course. Show off the Atari to your friends with GOLF PRO. Requires 16K and one joystick.

GAMES PACK I (Available for all computers) Price: $14.95 Cassette/$18.95 Diskette

GAMES PACK I contains the classic computer games of BLACKJACK, LUNAR LANDER, CRAPS, HORSERACE, SWITCH and more. These games have been combined into one large program for ease in loading. They are individually accessed by a convenient menu. This collection is worth the price just for the DYNACOMP version of BLACKJACK.

GAMES PACK II (Available for all computers) Price: $14.95 Cassette/$18.95 Diskette

GAMES PACK II includes the games CRAZY EIGHTS, JOTTO, ACEY-DUCEY, LIFE, WUMPUS and others. As with GAMES PACK I, all the games are loaded as one program and are called from a menu. You will particularly enjoy DYNACOMP's version of CRAZY EIGHTS.

Why pay $9.95 or more per program when you can buy a DYNACOMP collection for just $14.95?

MOON PROBE (Available for all computers) Price: $12.95 Cassette/$16.95 Diskette

This is an extremely challenging "lunar lander" program. The user must drop from orbit to land at a predetermined target on the moon's surface. You control the thrust and orientation of your craft plus direct the rate of descent and approach angle. Runs in 16K Atari.

SPACE TRAP (Atari only, 16K) Price: $14.95 Cassette/$18.95 Diskette

This galactic "shoot 'em up" arcade game places you near a black hole. You control your spacecraft using the joystick and attempt to blast as many of the alien ships as possible before the black hole closes about you.

SUPER SUB CHASE (Atari only) Price: $19.95 Cassette/$23.95 Diskette

SUPER SUB CHASE simulates a search and destroy mission. Set your course and keep an eye on the sonar readings as you hunt for the hidden submarine. Set the depth charge explosion depth and watch them sink towards the sub. This is an addictive game which takes advantage of the Atari's graphics and sound capabilities. One or two players. Joystick(s) required.

TWO PLAYER GAMES

NEW

TWO PLAYER GAMES (Available for all computers; 32K disk/diskette only)

DYNACOMP has acquired the distribution rights to the best eight of Xitron's war games. These two-player games were originally written for the North Star computer, but have since been converted to play on all of the computers currently supported by DYNACOMP. Because our licensing and development costs were so low, DYNACOMP offers these programs two to a disk(ette) for only $19.95/diskette, $23.95/disk. If you like war games, then this is a bargain you can not pass up.

Set #1: PANZER and BLITZKRIEG

PANZER

Date: 23 Nov. 1943 Place: Several miles west of Kiev, Russia. The Russians have just liberated Kiev and are moving quickly to reach the German forces which are preparing for a last desperate attempt to halt the Russian advance.

BLITZKRIEG

Date: Spring 1940 Place: Northern France. The German blitzkrieg in the east was complete. Germany had turned its attention to the west: France. The German forces has penetrated the Ardennes and Meuse. The heroism of Dunkirk, the defense of the Aisne-Somme position, and the final collapse of the French armies in the south has all passed. And, now, the drive on Paris . . .

Set #2: STARSHIP TROOPERS and INVASION OF THE MUD PEOPLE

STARSHIP TROOPERS

Date: Fortieth Century Place: Arachnid planet of Sheol. The first all-out battle on the planet Sheol which will match equal forces of Terran and alien units. The outcome will set the course of the conflict, for the planet of Sheol is a key position in the solar war.

INVASION OF THE MUD PEOPLE

A Peruvian army battalion has been dispatched to a remote village area to investigate the destruction of many local dwellings and the disappearance of most of the villagers. Eye-witnesses have reported strange creatures appearing from scores of slimy mud holes which have oddly begun forming across the terrain.

Set #3: FALL OF THE THIRD REICH and ARMORCAR

FALL OF THE THIRD REICH

Date: March, 1945 Place: Remagen, Germany. The allies under General Eisenhower had reached the Rhine. The Germans had failed in destroying the Ludendorff railroad bridge, allowing several allied divisions to cross before it finally collapsed on March 17 ... and so, the allies began their drive on Berlin.

ARMORCAR

Date: 2 Feb. 1944 Place: Minsk, Russia. A German front-line unit is hard pressed for radio equipment and medical supplies. A relief convoy of armored cars must reach them through partisan-infested territory.

Set #4: MOUNT SURIBACHI and MIDDLE EARTH

MOUNT SURIBACHI

Date: 16 Feb. 1945 Place: Iwo Jima. The Japanese opened fire from Mount Suribachi as the marines landed on the porkchop-shaped island. Gunfire from the hill could cover the entire island, thus it was a critical objective if the Americans were to capture and utilize the all-important air field. Mount Suribachi proved to be one of the most strongly defended positions in the Japanese theatre of war.

MIDDLE EARTH

Date: 1997 Place: MIDDLE EARTH. Through a maze of tunnels, crevices, and rocky passageways discovered leading from an inactive volcano in South America, a team of United Nations' researchers have undertaken a mission to an uncharted frontier: the center of the Earth. After a perilous journey spanning a period of several months, the mission has arrived at the Earth's core, a land of flames, steam, oceans, and unforeseen vegetation. And then the creatures of MIDDLE EARTH appeared . . . unmatched by the most frightening horror stories created by man . . .

MISCELLANEOUS

CRYSTALS (Atari only) Price: $14.95 Cassette/$18.95 Diskette

A unique algorithm randomly produces fascinating graphics displays accompanied with tones which vary as the patterns are built. No two patterns are the same, and the combined effect of the sound and graphics are mesmerizing. CRYSTALS has been used in local stores to demonstrate the sound and color features of the Atari. Runs in 16K.

NORTH STAR SOFTWARE EXCHANGE (NSSE) LIBRARY

DYNACOMP now distributes the 23 volume NSSE library. These diskettes each contain many programs and offer an outstanding value for the purchase price. They should be part of every North Star user's collection. Call or write DYNACOMP for details regarding the contents of the NSSE collection.

Price: $9.95 each/$8.95 each (4 or more)

The complete collection may be purchased for $159.95.

NEW

5¼" DISKETTES (soft sectored/ten sectored) Price: $39.95/20 Diskettes

As you might imagine, DYNACOMP purchases diskettes in large quantities and at wholesale prices. We want to pass the savings along to you!

BUSINESS and UTILITIES

NEW **PORTFOLIO MANAGEMENT** (Apple only) Price: $69.95 two Diskettes

The PORTFOLIO MANAGEMENT package was written by a stock broker to help manage portfolios for individual customers. With this program data files can be easily created and kept up to date. A variety of reports can be generated for clients which are attractively and professionally laid out. The user may define his/her own investment catagories. PORTFOLIO MANAGEMENT is a top quality, professional tool which will not only provide you with new conveniences but will also serve to enhance your appearance as an efficient and up to date advisor to your clients. Comes complete on two diskettes along with a 30 page instruction manual.

NEW **PERSONAL FINANCE SYSTEM** (Available for all computers) Price: $39.95 Diskette

PFS is a single diskette, menu-oriented system composed of ten different programs. Besides recording your expenses and tax deductible items, PFS will sort and summarize expenses by payee, and display information on expenditures by any of 26 user defined codes by month or by payee. PFS will even produce monthly bar graphs of your expenses by category! This powerful package requires only one disk drive, minimal memory (24K Atari, 32K North Star) and will store up to 600 records per disk (and over 1000 records per disk by making a few simple changes to the programs). You can record checks plus cash expenses so that you can finally see where your money goes and eliminate guesswork and tedious hand calculations. Contains high speed machine language sort. PFS has been demonstrated on network (CBS) TV!

FAMILY BUDGET (Apple and Atari only) Price: $34.95 Diskette

FAMILY BUDGET is a very convenient financial record-keeping program. You will be able to keep track of cash and credit expenditures as well as income on a daily basis. You can record tax deductible items and charitable donations. FAMILY BUDGET also provides a continuous record of all credit transactions. You can make daily cash and charge entries to any of 21 different expense accounts as well as to 5 payroll and tax accounts. Data are easily retrieved giving the user complete control over an otherwise complicated (and unorganized!) subject.

NEW **TEXT MASTER** (Apple 32K, diskette only) Price: $49.95 Diskette

TEXT MASTER is a general purpose text editor for the Apple II computer. It features powerful, English-oriented commands which permit the complete manipulation of textural information. The information treated may be correspondence, computer programs, data to be used by other programs, and more. TEXT MASTER also interfaces with any printer connected to your Apple. The minimum system requirements are 32K of RAM, Applesoft on ROM, at least one disk, and a lower case adapter. TEXT MASTER can process any length file segment by segment. Thus it is possible to process files as large as a diskette. Comes complete with an efficient 16 page manual. TEXT MASTER is equivalent in capability to many word processing systems costing 3 x or more in price. The commands available in TEXT MASTER are: COLLECT, USE, EXECUTE, NONUM, INSERT, MERGE, STOP, RENUM, DELETE, SAVE, COPY, FREE, REPLACE, WAIT, MOVE, LENGTH, LIST, RESAVE, CLEAR, AUTO, RETRY, APPEND, SET, MANUAL, CHANGE, SCRATCH, SHOW, CATALOG, MODIFY, COMPARE, NUM, DISPLAY, HELP.

INTELINK (Atari only) Price: $49.95 Diskette

This software package contains a menu-driven collection of programs for facilitating efficient two-way communications through a full duplex modem (required for use). In one mode of operation you may connect to a data service (e.g., The SOURCE or MicroNet) and quickly load data such as stock quotations onto your diskette for later viewing. This greatly reduces "connect time" and thus the service charge. You may also record the complete contents of a communications session. Additionally, programs written in BASIC, FORTRAN, etc. may be built off-line using the support text editor and later "uploaded" to another computer, making the Atari a *very* smart terminal. Even Atari BASIC programs may be uploaded. Further, a command file may be built off-line and used later as controlling input for a time-share system. That is, you can set up your sequence of time-share commands and programs, and the Atari will transmit them as needed; batch processing. All this adds up to saving both connect time and your time.

NEW **PAYFIVE** (Apple II plus diskette, two drives required) Price: $149.95

This is an enormously flexible employee payroll system with extraordinarily good human engineering features. PAYFIVE prints checks and compiles the required federal, state and local forms for up to 148 employees. The pay methods may be hourly, salary, commission or any combination. There are multiple options for pay periods, and they also can be used in any combination. PAYFIVE includes *many* other features and comes extremely well documented with a 200 page manual. The manual may be purchased separately for $30, and that payment later applied to the software purchase.

SHOPPING LIST (Atari only) Price: $12.95 Cassette $16.95 Diskette

SHOPPING LIST stores information on items you purchase at the supermarket. Before going shopping, it will remind you of all the things you might need, and then display (or optionally print) your shopping list and the total cost. Adding, deleting, changing and storing data is very easy. Runs with 16K.

NEW **TAX OPTIMIZER** (Available for all computers) Price: $59.95 Diskette

The TAX OPTIMIZER is an easy-to-use, menu-oriented software package which provides a convenient means for analyzing various income tax strategies. The program is designed to provide a quick and easy data entry. Income tax is computed by all tax methods (regular, income averaging, maximum and alternate minimum tax). The user may immediately observe the tax effect of critical financial decisions. TAX OPTIMIZER has been thoroughly field tested in CPA offices and comes complete with the current tax tables in its data files. TAX OPTIMIZER is tax deductible!

STOCK MASTER/STOCK PLOT (Apple 48K) Price: $59.95 Diskette

This is a full-featured stock portfolio management and analysis system. Ten years of records on up to thirty stocks may be maintained. You may record prices, revenue, earnings/share, ROE, quarterly earnings and dividends, transactions, long/short term gains, P/E, indexes (DJ, S & P, NASDAQ) and MORE! You may plot (HIRES) the price history of any stock against any other, time, or the indexes. Portfolio value may be evaluated at any time. Comes complete with superbly written instructions and sample files on a second diskette.

TURNKEY AND MENU (Atari only) Price: $17.95 Diskette

TURNKEY is a utility program which allows you to create autoboot/autorun diskettes easily. Simply load and run TURNKEY, load the program diskette to be modified, and answer the questions! The TURNKEY diskette also comes with DOS 2.0 and includes another program, MENU. MENU lists the contents of your diskette alphabetically, and permits the running of any BASIC program on the diskette by typing a single key. TURNKEY and MENU provide you with the ability to run any program on your diskette by simply turning on the computer and pressing a single key.

STOCKAID (Atari only) Price: $29.95 Diskette

STOCKAID provides a powerful set of tools for stock market analysis. With STOCKAID you can display point and figure charts, as well as bar charts with oscillators. You can also examine long term moving averages and on-balance volume features. STOCKAID allows you to input daily data with a single diskette storage capability of 239 days x 16 stocks. Included are stock dividend and split adjustment capabilities. A very professional package!

NEW **NYINDEX** (Atari only) Price: $29.95 Diskette

NYINDEX is a comprehensive software package for storing, retrieving and plotting New York Stock Exchange information. The daily data treated includes the composite index, advances, declines, new highs and new lows. Graphical displays include the above plus the index oscillator, cumulative advances/declines and moving averages. Data entry and editing is easy. The diskette includes more than two years of daily data. NYINDEX is an excellent companion to STOCKAID.

PLAYER-MISSILE GRAPHICS TABLET (Atari only) Price: $19.95 Diskette

The PLAYER-MISSILE GRAPHICS TABLET was designed to take the drudgery out of developing four color displays in GRAPHICS MODE 7. No longer will you have to read the locations of those tiny blocks on your graph paper and calculate PLOTs and DRAWTOs. With PMG you will be able to easily design colorful graphic displays with your joystick and save them on diskette for later recall.

LIFE CYCLE ANALYSIS AND DEPRECIATION (Apple diskette only) Price: $39.95 Diskette

This software package creates a data file of business expenses for equipment which can later be used to calculate and display a variety of reports. You may project annual costs, find the present worth, create depreciation schedules and justify tax deductions. The evaluation techniques conform to standards set by federal agencies. This is an invaluable package for any businessman who has invested in equipment. LIFE CYCLE ANALYSIS features an easy to use data file creation section and provides formatted hardcopy reports for use in presentations or for tax record keeping purposes. When used for generating tax information, this package is tax deductible! Requires 48K. Comes on two diskettes.

NEW **MICROMAGIC** (Apple diskette only) Price: $39.95 Diskette

The emphasis of this program is clearly the MAGIC! MICROMAGIC offers outstanding versatility in its ability to function as a stand alone entertainment package or as a utility program to create stunning *animated* graphics for use in other programs. The secret lies in MICROMAGIC's special on screen graphics editor. You control a graphics cursor directly from the keyboard, creating high resolution images using all 16 available colors. When you are done with a picture, it can be saved on disk with a single key command. Up to 24 images can be saved as "frames" of a movie, and then played back at high speed to creat short animated sequences. The effects are truly stunning.

This package comes complete with demonstration programs so that even novice users can get immediate results. No programming skills are necessary to use MICROMAGIC. If you have been frustrated by the effort required to create graphics images with your computer, MICROMAGIC will delight you.

SHAPE MAGICIAN (Apple II, 48K, diskette only) Price. $29.95

At last! An utility for painlessly creating graphics shapes for the Apple. Create, edit and save up to 30 shapes which can then be used to develop arcade games or to simply enhance your programs. Add that professional touch!

ORDERING INFORMATION

All orders are processed and shipped within 48 hours. Please enclose payment with order and include the appropriate computer information. If paying by VISA or Master Card, include all numbers on card. Purchase orders accepted.

Shipping and Handling Charges
Within North America: Add $2.00
Outside North America: Add 15% (Air Mail)

Delivery
All orders (excluding books) are sent First Class.

Quantity Discounts
Deduct 10% when ordering 3 or more programs; 20% when ordering 5 or more. Dealer discount schedules available upon request.

8" CP/M Disks
Add $2.50 to the listed diskette price for each 8" floppy disk (IBM soft sectored CP/M format). Programs run under Microsoft MBASIC or BASIC-80.

5¼" CP/M Disks
All software available on 8" CP/M disks is also available on 5¼" disks, North Star, Osborne, Superbrain and NEC format.

Ask for DYNACOMP programs at your local software dealer. Write for detailed descriptions of these and other programs from DYNACOMP.

DYNACOMP, Inc. (Dept. C)
1427 Monroe Avenue
Rochester, New York 14618
24 hour message and order phone: (716) 442-8731
Toll free order phones: (800) 828-6772
(800) 828-6773
Office phone (9AM-5PM EST): (716) 442-8960

New York State residents please add 7% NYS sales tax.

EDUCATION

HODGE PODGE (Apple 48K only) Price: $14.95 Cassette $18.95 Diskette

Let HODGE PODGE be your child's teacher. Pressing any key on your Apple will result in a different and intriguing "happening" related to the letter or number of the chosen key. The program's graphics, color and sound are a delight for children from ages 1½ to 7. HODGE PODGE is a non-intimidating teaching device which brings a new dimension to the use of computers in education. See the excellent reviews of this very popular program in INFOWORLD and SOFTALK.

TEACHER'S AIDE (Atari and PET only) Price: $13.95 Cassette/$17.95 Diskette

TEACHER'S AIDE consists of three basic modules contained in one program. The first module provides addition and subtraction exercises of varying levels of difficulty. The second module consists of multiplication problems in which the student may be tested both on the final answer and/or on the subtotal answers in the long hand procedure. Several levels of complexity are provided here as well. The third module consists of division problems; one particularly nice feature of the division module is that the long hand division steps can be displayed along with the remainder in order to clearly demonstrate the procedure by which the remainder is derived. Using TEACHER'S AIDE is not merely a drill, but rather a learning experience.

STATISTICS and ENGINEERING

DIGITAL FILTER (Available for all computers) Price: $39.95 Cassette/$43.95 Diskette

DIGITAL FILTER is a comprehensive data processing program which permits the user to design his own filter function or choose from a menu of filter forms. In the explicit design mode the shape of the frequency transfer function is specified by directly entering points along the desired filter curve. In the menu mode, ideal low pass, high pass and bandpass filters may be approximated to varying degrees according to the number of points used in the calculation. These filters may optionally also be smoothed with a Hanning function. In addition, multi-stage Butterworth filters may be selected. Features of DIGITAL FILTER include plotting of the data before and after filtering, as well as display of the chosen filter functions. Also included are convenient data storage, retrieval and editing procedures.

DATA SMOOTHER (Not available for Atari) Price: $19.95 Cassette/$23.95 Diskette

This special data smoothing program may be used to rapidly derive useful information from noisy business and engineering data which are equally spaced. The software features choice in degree and range of fit, as well as smoothed first and second derivative calculation. Also included is automatic plotting of the input data and smoothed results.

FOURIER ANALYZER (Available for all computers) Price: $19.95 Cassette/$23.95 Diskette

Use this program to examine the frequency spectra of limited duration signals. The program features automatic scaling and plotting of the input data and results. Practical applications include the analysis of complicated patterns in such fields as electronics, communications and business.

TFA (Transfer Function Analyzer) Price: $19.95/$23.95 Diskette

This is a special software package which may be used to evaluate the transfer functions of systems such as hi-fi amplifiers and filters by examining their response to pulsed inputs. TFA is a major modification of FOURIER ANALYZER and contains an engineering-oriented decibel versus log-frequency plot as well as data editing features. Whereas FOURIER ANALYZER is designed for educational and scientific use, TFA is an engineering tool. Available for all computers.

HARMONIC ANALYZER (Available for all computers) Price: $24.95 Cassette/$28.95 Diskette

HARMONIC ANALYZER was designed for the spectrum analysis of repetitive waveforms. Features include data file generation, editing and storage/retrieval as well as data and spectrum plotting. One particularly unique facility is that the input data need not be equally spaced or in order. The original data is sorted and a cubic spline interpolation is used to create the data file required by the FFT algorithm.

FOURIER ANALYZER, TFA and HARMONIC ANALYZER may be purchased together for a combined price of $51.95 (three cassettes) and $63.95 (three diskettes).

REGRESSION I (Available for all computers) Price: $19.95 Cassette/$23.95 Diskette

REGRESSION I is a unique and exceptionally versatile one-dimensional least squares "polynomial" curve fitting program. Features include very high accuracy; an automatic degree determination option, an extensive internal library of fitting functions; data editing; automatic data, curve and residual plotting; a statistical analysis (e.g.: standard deviation, correlation, coefficient, etc.) and much more. In addition, new fits may be tried without reentering the data. REGRESSION I is certainly the cornerstone program in any data analysis software library.

REGRESSION II (Available for all computers) Price: $19.95 Cassette/$23.95 Diskette

PARAFIT is designed to handle those cases in which the parameters a imbedded (possibly nonlinearly) in the fitting function. The user simply inserts the functional form, including the parameters (A(1), A(2), etc.) as one or more BASIC statement lines. Data, results and residuals may be manipulated and plotted as with REGRESSION I. Use REGRESSION I for polynomial fitting, and PARAFIT for those complicated functions.

MULTILINEAR REGRESSION (MLR) (Available for all computers) Price: $24.95 Cassette/$28.95 Diskette

MLR is a professional software package for analyzing data sets containing two or more linearly independent variables. Besides performing the basic regression calculation, this program also provides easy to use data entry, storage, retrieval and editing functions. In addition, the user may interrogate the solution by supplying values for the independent variables. The number of variables and data size is limited only by the available memory.

REGRESSION I, II and MULTILINEAR REGRESSION may be purchased together for $51.95 (three cassettes) or $63.95 (three diskettes).

ANOVA (Not available on Atari cassette or for PET/CBM) Price: $39.95 Cassette/$43.95 Diskette

In the past the ANOVA (analysis of variance) procedure has been limited to the large mainframe computers. Now DYNACOMP has brought the power of this method to small systems. For those conversant with ANOVA, the DYNACOMP software package includes the 1-way, 2-way and N-way procedures. Also provided are the Yates 2^{K-P} factorial designs. For those unfamiliar with ANOVA, do not worry. The accompanying documentation was written in a tutorial fashion (by a professor in the subject) and serves as an excellent introduction to the subject. Accompanying ANOVA is a support program for building the data base. Included are several convenient features including data editing, deleting and appending.

BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2 (Not available for Atari)

DYNACOMP is the exclusive distributor for the software keyed to the popular texts *BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2* by F. Ruckdeschel (see advertisements in BYTE magazine). These subroutines have been assembled according to chapter. Included with each collection is a menu program which selects and demonstrates each subroutine.

Volume 1
Collection #1: Chapters 2 and 3 - Data and function plotting; complex variables and functions.
Collection #2: Chapter 4 - Extended matrix and vector operations.
Collection #3: Chapters 5 and 6 - Random number generators (Poisson, Gaussian, etc.); series approximations.
Price per collection: $16.95 Cassette $20.95 Diskette
All three collections are available for $44.95 (three cassettes) and $53.95 (three diskettes).

Volume 2
Collection #1: Chapter 1 - Linear, polynomial, multidimensional, parametric least squares.
Collection #2: Chapter 2 - Series approximation techniques (economization, inversion, reversion, shifting, etc.)
Collection #3: Chapter 3 - Functional approximations by iteration and recursion.
Collection #4: Chapter 4 - CORDIC approximations to trigonometric, hyperbolic, exponential and logarithmic functions.
Collection #5: Chapter 5 - Table interpolation, differentiation and integration (Newton, LaGrange, splines).
Collection #6: Chapter 6 - Methods for finding the real roots of functions.
Collection #7: Chapter 7 - Methods for finding the complex roots of functions.
Collection #8: Chapter 8 - Optimization by steepest descent.
Price per collection: $14.95 Cassette $18.95 Diskette

All eight collections are available for $99.95 (eight cassettes) and $129.95 (eight diskettes).

Because the texts are a vital part of the documentation, *BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2* are available from DYNACOMP:

BASIC SCIENTIFIC SUBROUTINES, Vol. 1 (319 pages): $19.95 + 75¢ postage
BASIC SCIENTIFIC SUBROUTINES, Vol. 2 (790 pages): $23.95 + $1.50 postage

See reviews in KILOBAUD, Dr. Dobbs, and ACCESS.

NEW **SOFTNET** (Apple II and TRS-80 48K diskette only) Price: $129.95

SOFTNET may be used to create models of liquid pipeline systems to evaluate their flow performance. Up to 150 nodes with up to 150 connecting elements may be simulated, and models may be combined to form yet larger models. If you are involved in water distribution systems, chemical fluid flow problems, building plumbing, or similar situations, this is an ideal analysis tool.

NEW **FILTER ANALYSIS** (Apple only) Price: $19.95 Cassette/$23.95 Diskette

FILTER ANALYSIS is the ideal program for determining the frequency response of passive filters. Any number of RLC components may be included, and any number of poles treated. FILTER ANALYSIS features its own mini-language which makes circuit description simple. Results may be printed in tabular form or plotted in HIRES graphics (decibels versus log-frequency).

ACTIVE CIRCUIT ANALYSIS (Available for all computers) Price: $35.95 Cassette/$39.95 Diskette

With ACAP you may analyze the response of an active or passive component circuit. The circuit may be probed at equal steps in frequency, and the resulting complex voltages at each component juncture examined; the frequency response of a filter or amplifier may be completely determined with respect to both amplitude and phase. In addition, ACAP prints a statistical analysis of the range of voltage responses which result from tolerance variations in the components. ACAP is easy to learn and use. Circuit descriptions may be saved onto cassette or diskette to be recalled at a later time for execution or editing. ACAP should be part of every circuit designer's program library. Requires 48K.

LOGIC SIMULATOR (Available for all computers) Price: $35.95 Cassette/$39.95 Diskette

Test your complicated digital logic design with respect to given set of inputs to determine how well the circuit will operate. The elements which may be simulated include multiple input AND, OR, NOR, EXOR, EXNOR and NAND gates, as well as inverters, J-K and D flip-flops, and one-shots. Inputs may be clocked in with varying clock cycle lengths, displacements and delays may be introduced to probe for glitches and race conditions. A timing diagram for any given set of nodes may be plotted. Save your breadboarding until the circuit is checked by LOGIC SIMULATOR. Requires 48K.

NEW **BEAM DEFLECTION** (Available for all computers) (disk/diskette only) Price: $29.95 Diskette/$32.45 Disk

BEAM DEFLECTION Is the first in DYNACOMP's new series of structural analysis software packages. It consists of two programs. The first program permits the development of data files which describe the problem. For example, the ends of the beam may be pinned, clamped or free. The beam may be uniformly supported by an elastic bed, or held up by springs variously placed and having differing spring constants. The elasticity and cross section of the beam may vary along its length. The load may be uniformly distributed or it may include discrete forces. The beam may be pinned at various points along its length. And so on. All this information may be easily entered and edited using the data input program.

Following this the analysis program is called. The calculated results are the stress and deflections of the beam, both in numerical and graphical form. since the input data is saved, cases may be easily re-run with modification, thereby permitting iterative design.

The documentation which comes with BEAM DEFLECTION clearly shows how to use the software. In addition, three text problems are described and demonstrated to ensure that you understand how to use the program. Also, helpful theoretical information is supplied in the appendix.

STATTEST (Not available on Atari cassette or for PET/CBM) Price: $19.95 Cassette/$23.95 Diskette

This is a statistical inference package which helps you make wise decisions in the face of uncertainty. In an interactive fashion you can build and edit data files and test the differences in means, variances and proportions. STATTEST will also perform data analysis as well as do linear correlation and regression. This menu-directed statistical workhorse is rounded out with a chi-square contingency test and a (uniform and normal) random sample generator. The documentation is written by a college professor who guides you through the various tests.

ABOUT DYNACOMP

DYNACOMP is a leading distributor of small system software with sales spanning the world (currently in excess of 50 countries). During the past three years we have greatly enlarged the DYNACOMP product line, but have maintained and improved our high level of quality and customer support. The achievement in quality is apparent from our many repeat customers and the software reviews in such publications as COMPUTRONICS, 80 Software Critique, A.N.A.L.O.G., Softalk, Creative Computing and Kilobaud. DYNACOMP software has also been chosen for demonstration on network television. Our customer support is as close as your phone. It is always friendly. The staff is highly trained and always willing to discuss products or give advice.

CIRCLE 168 ON READER SERVICE CARD

Gamma Hockey

Getting Iced

Norman Schreiber and Witold Urbanowicz

creative computing

SOFTWARE PROFILE

Name: Hockey
Type: Two player sports action game
System: Atari 400/800 16K
Format: Disk
Language: Machine
Summary: Achieves its goal
Price: $29.95
Manufacturer:
Gamma Software
P.O. Box 25625
Los Angeles, CA 90025

Hockey, by Gamma Software, is almost fast, never furious, and generally fun. That's what we—Witold, Norman, Roman and Jason—discovered one Stanley Cup weekend.

We loaded the game (which, by the way, requires 16K), powered up, and the screen beckoned with a menu of options—nine in all. (Game durations are three, five or eight minutes and two, three or four people can funnel their hostile energy into knocking a puck across the ice.)

Each game begins with the last tones of the "Star Spangled Banner," followed immediately by the roar of the crowd. It's four on four as one goalie and three free-skating forwards go against each other.

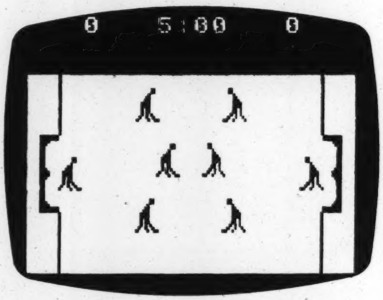
Using joysticks the human opponents manage the teams. With the three-player option two (one controlling the goalie) gang up on the third. Four-player play brings both goalies under joystick control. A scoreboard and clock sit at the top of the screen.

We first selected a two-player, three-minute game. The puck was dropped and the two center forwards, under joystick control, went into action. Each goalie's movement in front of the net corresponded with up and down movements of the joystick. The other four forwards moved as "smart" players.

The action was intense. The hockey puck slid and caromed across the horizontal ice, and the players scrambled to dominate the puck. Joystick control remained with the original two until the puck struck another player's stick. And *voila*, the joystick managed that player. When the puck was free, the joysticks controlled the original center forwards. This created opportunities for some fancy passing, a neat way to outsmart the opponent or even oneself.

Inevitably, the action brought the players, in one Gamma glut, directly in front of a net. A shot was taken. The goalie edged sidewards and successfully blocked. Another head-on shot brought another block. The next try started from the corner and homed in at a sharp angle. It whizzed past the goalie and the crowd roared. Players reassembled at center-ice for a new face-off. And so on.

At game's end, the score was tied, so we were thrown into sudden death overtime and given an additional three minutes. Unfortunately neither glorious team could score. There was no additional overtime, so we settled for a tie and celebrated with a rematch.



Gamma *Hockey* arouses competition. The four of us scarcely kept our tails upon our seats as we played the game at various angles of leanforwardness. The value of the three- and four-player options was that we adults could also get into the game, rather than just hover. Actually, the four-hand participation did make the game that much more exciting. It is unfortunate, however, that no solitaire option exists. One would like to get one's chops together in the quiet of one's own fantasies.

The two teams are blue and green; except on a black-and-white monitor in which case they are grey and grey. You can tell who is on first by the direction in which the hockey stick points. The thoughtful designer(s) made joystick-controlled players flash when the puck was free. However, the "smart" players tend to flicker as they move. Consequently, there was a certain amount of confusion at certain points.

Norman Schreiber and Witold Urbanowicz, 135 Eastern Parkway, Brooklyn, NY 11238

APPLE • ALTOS • ATARI • MAXELL • DYSAN • EPSON • CCS • SHARP • CASIO • HP • VERBATIM • MEMOREX • SOROC • CORVUS • ADDS

MICRO

BUSINESS WORLD INC.
Information Line (213) 996-2252
TOLL FREE MAIL ORDER LINES
(800) 423-5886 Outside Calif.

HEWLETT PACKARD

HP41 CV

OUR PRICE
$239.00
MSL 345.00 *Save* 106.00

SPECIAL OF THE MONTH

Put a Genie In Your Computer Intelligent Printer Interface Card

Works With
- Integer Basic
- Applesoft*
- Pascal 1.0 & 1.1
- CP/M**

OUR PRICE
$119.00
MSL 159.00
Save 40.00

*Applesoft is a registered Trademark of Apple Computer, Inc.
**CP/M is a registered trademark of Digital Research.

MICRO-SCI
APPLE II+ COMPATIBLE DRIVE

W/ CONTROLLER		W/O CONTROLLER	
MSL 549.00	OUR PRICE 429.00	MSL 449.00	OUR PRICE 379.00
Save 216.00	COMPARE TO APPLE DRIVE	*Save* 146.00	COMPARE TO APPLE DRIVE

APPLE IS A REG. TRADE MARK OF APPLE COMPUTER

IBM PERSONAL COMPUTER

INCLUDES:
2 Drives DS/DD
Color Graphic Board
64K Memory
12" BMC GRN PHS

MSL 3305.00
OUR PRICE $2895.00
Save 410.00
*Subject to availability

SMITH CORONA TPI DAISY WHEEL PRINTER

Letter Quality
SERIAL OR PARALLEL

OUR PRICE **$599.00**
MSL 895.00
Save 296.00

CASIO FX9000P PERSONAL COMPUTER

POWERFUL CA-BASIC
NEW
AND C/MOS-RAM

MSL 995.00
OUR PRICE $599.00
Save 396.00

LE MONITOR

METAL CABINET

9" GRN. PHS. MONITOR
12" GRN. PHS. MONITOR
1 Yr. Warranty

MSL 189.00
OUR PRICE $119.00
Save 70.00

APPLE II PLUS 48K

*Subject to availability

MSL 1530.00
$1095.00
Save 435.00

APPLE IS A REG. TRADEMARK OF APPLE COMPUTER

THE APPLE COMPATIBLE ALTERNATIVE
FRANKLIN BUSINESS SYSTEM

Franklin Ace 1000 system • 64K • Disk Drive with controller card • 12" green phs. video monitor.
Color optional $49.00

$1695.00

SAVE $1000 COMPARED TO APPLE SYSTEM

OSBORNE PERSONAL COMPUTER

INCLUDES SOFTWARE

- CPM
- WORDSTAR
- SUPERCALC
- MAIL MERGE
- CB BASIC
- M BASIC

MSL 1795.00
OUR PRICE 1595.00
Save $200.00

AXIOM DOT MATRIX GP 100

8½" wide paper

MSL 389.00
OUR PRICE $269.00
Save 120.00

HP 125

OUR PRICE $1975.00
MSL 2750.00
Save 775.00

DUAL MASTER DRIVE
MSL 2500.00
OUR PRICE 1595.00
Save 905.00

XEROX 820
WORD PROCESSING SYSTEM (INCLUDES SOFTWARE)

MSL 3495.00
OUR PRICE $2749.00
Save 746.00

NEC STUDENT SYSTEM 64K

*NEC PC 80001
*NEC PC 8012
*NEC PC 8031
12" Grn. Phs. Video Monitor

MSL 2839.00
OUR PRICE $2095.00
Save 744.00

HEWLETT PACKARD

HP-87

MSL 2495.00
OUR PRICE $1899.00
Save 896.00

commodore VIC=20

COMPLETE COMMODORE LINE AVAILABLE

Vic-TV Modual	$19.00
Vic Cassette	$65.00
Vic Disk Drive	$ Call
Vic 6 Pak program	$44.00

MSL 299.00
OUR PRICE $189.00
Save 110.00

EPSON

INCLUDES GRAFTRAX

	MSL	OUR PRICE	*Save*
MX 80 III	645.00	429.00	216.00
MX 80FT III	745.00	535.00	210.00
MX 100 III	995.00	669.00	326.00

commodore STUDENT SYSTEM

4032 - 32K 40 COL CRT
4940 - DUAL DISK DRIVE

MSL 2590.00
OUR PRICE $1978.00
Save 612.00

RADIO SHACK TRS 80 MOD III

48K 2 DRIVE

MSL 2495.00
OUR PRICE $1733.00
Save 762.00

VIC 20 EXPANSION CHASSIS

OUR PRICE 189.00
MSL 229.00
Save 40.00

FEATURES: • 7 expansion slots • All aluminum construction • Large power supply with torodial transformer • 5 volt supply direct ot the VIC 20 for cooler operation • 24 volt supply for the Arfon Micro VIC Printer • Detachable cover protects cartridges • Houses VIC and Expansion in one portable unit • Holder for RF modulator • Supports all VIC 20 cartridges from Arfon Micro, Commodore and others

WE RESERVE THE RIGHT TO CORRECT TYPOGRAPHICAL ERRORS.
THIS AD SUPERCEDES ALL PREVIOUS ADS.

MICRO MAIL ORDER

BUSINESS WORLD WAREHOUSE
18720 Oxnard, #108
Tarzana, CA 91356

OUTSIDE CA CALL TOLL FREE 1 (800) 423-5886 IN CA (213) 996-2252

Telex: 182852
Answer: MICKO TZNA

*California residents add 6% sales tax.
**Add 3% Shipping & Handling — Add 3% surcharge for credit cards. Orders cannot be shipped unless accompanied by payment, including shipping, handling and tax where applicable.

Name (Please print) ______
Address ______
City ______ State ______ Zip ______

Qty	Make	Model	Description	Price	Total

TOTAL ORDER $ ______
TAX IF APPLICABLE* ______
SHIPPING & HANDLING** ______
TOTAL ENCLOSED $ ______

Certified Check or M.O.
Bank Wire Transfer

Allow 2 weeks clearance for personal check

VISA MasterCard

CREDIT CARD # ______
Exp Date ______ Signature ______

MAXELL • DYSAN • EPSON • CCS • SHARP • CASIO • HP • VERBATIM • MEMOREX • SOROC • CORVUS • PERSONAL SOFTWARE • CCS

BMC • CENTRONIC • NEC • HAZELTINE • AMPEX • VERBATIM • HITACHI • HAYDEN • CANON • NOVATION • D.C. HAYS MICROCOMPUTERS • PAPER TIGER • PERSONAL SOFTWARE • GTE •

HP • D.C. HAYS MICROCOMPUTERS • PAPER TIGER • GTE • DIABLO • BMC • CENTRONIC • NEC • HAZELTINE • MEMOREX • AMPEX • PERSONAL SOFTWARE • ADDS • XEROX • DIABLO

CIRCLE 208 ON READER SERVICE CARD

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

INVESTMENT SOFTWARE FOR

THE INTELLIGENT INVESTOR™

Series I

- **Calculates**
  - Time Weighted Rates of Return
  - Dollar Weighted Rates of Return
  - Portfolio Yields
  - Traditional 1-10 year time spans plus User Defined Specific Periods
- **Evaluates**
  - Your Investment Decisions in Terms of Alternatives
  - Your Investment Recommendations & Decisions
- **Keeps Records of All**
  - Investments
  - Cash Additions & Withdrawals
  - Quarterly Portfolio Valuations
  - Dividends & Interest
  - Brokerage Commissions
  - Margin Expenses
- **Tells You**
  - Who Made More from Your Account — You or Your Stockbroker
- **Is**
  - Error-Tolerant and Trouble Free for Use by the Computer Novice
  - User Friendly — Menu Driven
- **Utility**
  - All Investment Media — Stocks, Bonds, Real Estate, Commodities, Options, Etc.
- **Tax Deductible**
  - Consult Your Accountant for Requirements

$75

* * * * *

AVAILABLE FOR:

APPLE III & APPLE II (APPLESOFT)
TRS-80
IBM PERSONAL COMPUTER
NEC PC 8000

ROBERT GENTRY
& Associates, Ltd.
810 Camelview Plaza
6900 East Camelback Road
Scottsdale, Arizona 85251
(602) 941-5212

PLEASE ADD $3.00 SHIPPING & HANDLING

Telephone Orders Accepted on Visa or Mastercharge

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

CIRCLE 191 ON READER SERVICE CARD

SOFTWARE GALORE
Best Prices Anyway.
Member, Better Business Bureau

	LIST	SALE
IBM		
Home Accountant Plus	150.00	120.00
Write On	129.95	103.96
Zork II	39.95	31.96
T.I.M. III	495.00	396.00
Easywriter II	350.00	280.00
Wordstar	495.00	396.00
IBM Joysticks	64.95	51.96
Visicalc 256K	250.00	199.00
HARDWARE		
Rana Disk Drives	449.00	359.20
Micro Modem II	379.00	285.00
Nec Printer 3510	2,290.00	1,832.00
Apple Cat II	389.00	330.65
Super Fan II	79.95	65.56
Vision 80 Column Card	395.00	316.00
Nec Green Screen	285.00	185.00
Amdek Color	695.00	560.00
Espon MX80FT	745.00	595.00
Espon MX100	995.00	865.00
APPLE		
Microsoft Prem. Sys.	775.00	520.00
Visicalc 3.3	250.00	185.00
Videoterm 80 col.	345.00	270.00
Systems Plus (ALL MODS)	1,395.00	995.00
D.B. Master	229.00	183.00
Wordstar	375.00	275.00
Microsoft Softcard	395.00	270.00
d Base II	700.00	499.00
Screenwriter II	129.95	103.00
Supertext 40/80	150.00	120.00
Visitrend/Plot	300.00	225.00
Bandits	34.95	27.96

VISA ORDERS 800-423-6326 master charge
Calif./memberships 213-827-1851
We are a membership buying service.
Member, Better Business Bureau.
(School P.O. welcomed)
P.O. Box 10005 • Marina del Rey, CA 90291

CIRCLE 280 ON READER SERVICE CARD

SRA Educational Courseware: "Because learning matters"

Micro Discovery™ (Grade 4 and up)
For your Apple*, IBM*, or Radio Shack* personal computers.

A complete introduction to the personal computer for grades 4 and up. Gives practical, hands-on experience with computers and presents the basics of
- theory
- operation
- programming
- the computer and society

2 Diskettes, 20 copies of Student Workbook, and Instructor's Guide, $190.00.
*Registered trademarks.

☐ Yes! I want Micro Discovery! Please contact me immediately.
☐ Send me literature about Micro Discovery.

Name__________
School__________
Address__________
City, State, Zip__________
Telephone__________

For faster service, call SRA toll-free:
(800) 621-0476
Or mail this coupon to:

SRA®
SCIENCE RESEARCH ASSOCIATES, INC.
155 N. Wacker Drive, Chicago, Il. 60606

CIRCLE 287 ON READER SERVICE CARD

Hockey, continued...

Perhaps the most intriguing, at least to reviewers, aspect of Gamma *Hockey* is the slow rate at which the players move speedily. Said nine-year-old Roman, "Can't you make them go faster?"

Said 35-year-old Witold, "It might have something to do with the horizontal movement of the game in what is basically a vertically-structured medium."

Norman, 41-years-old, observed that there was no way for players on one team to maim, destroy or righteously punish players on the other team. (This happens to be his favorite feature in the Activision VCS cartridge.) And 14-year-old Jason kept on scoring goals.

Something should be said for and against the sound. It keeps the game going and provides some pleasant texture for the ongoing battle. However, after playing 12 games, one gets to feel a bit unpatriotic at wishing the familiar notes of the national anthem would speed up radically (pardon the expression). Perhaps if there were a Kate Smith voice chip things would be different. Perhaps not.

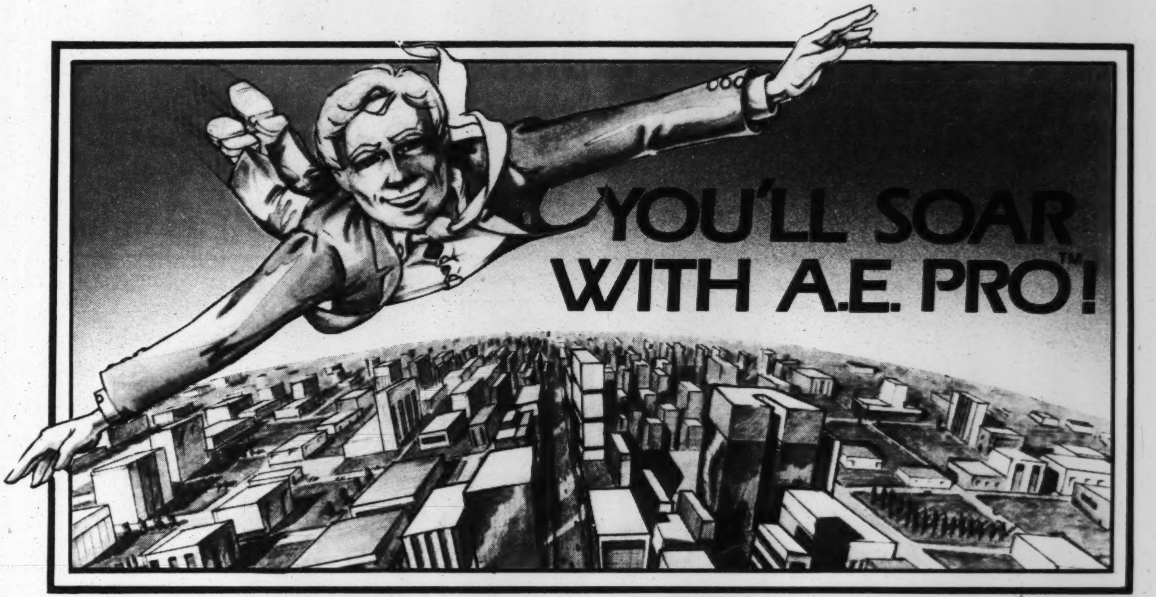
The crowd noise, though useful, sounds suspiciously like our television sets at four in the morning when there's nothing to pick up but noise, and made us wish for a Dolby override.

We also should note that during one of our many games, four players suddenly disappeared. They could not be found. They certainly weren't in the penalty box. They just as mysteriously reappeared in a few seconds. We tried to render the hockey players invisible again; and failed. We haven't the foggiest notion why this happened. Not even Witold has a theory. Final note: The documentation is clear, concise, easy-to-read, and offers some useful tips.

Postscript: We had to go through all the options. After all, we decided, we really had to explore the game. We owed that much to our readers. We would have ended the tests sooner, but regardless of which time option we played, the final buzzer always went off too soon. ☐

CIRCLE 348 ON READER SERVICE CARD

"My son, the console operator."



After you experience Data Communications with A.E. PRO, you'll never settle for being earthbound again!

SOUTHWESTERN DATA SYSTEMS...

- **First** to create terminal software for the Apple II
- **First** to use Macros in a data communications package
- **First** to provide terminal emulation in Apple communications software

Once again, SOUTHWESTERN DATA SYSTEMS creates a software package so far advanced, so innovative, that there are no comparisons.

A.E. PRO (ASCII Express "The Professional"™) truly sets new standards!

Literally thousands of man-hours of work and study have produced the first data communications package that fully utilizes the potential of your Apple Computer System. What does this mean to you?

COMPLETE HARDWARE COMPATIBILITY

Only A.E. PRO takes full advantage of ALL current modem devices available for the Apple II.

Only A.E. PRO supports ALL 80 column boards for the Apple II.

Only A.E. PRO supports ALL printer cards for the Apple II.

This means ALL communications interfaces, ALL printer interfaces, and ALL display interfaces including 80 column cards and external terminals. It couldn't be simpler.

Speeds of up to 9600 Baud are supported, including 110, 300, 1200 and Baudot.

EASY DATA TRANSFER

Data transfer is what communications software is all about. A.E. PRO lets you send and receive with equal ease.

A simple dual key stroke will direct incoming data to its large, up to 28K "capture-buffer", your printer, (with no character loss), or both simultaneously. The buffer can then be written to disk, printed or edited with A.E. PRO's versatile built-in editor.

Data larger than the capacity of the buffer can be saved in buffer-sized "chunks", by use of the auto-save feature, an extension of the popular XON/XOFF protocol used by most main frame computers. As your Apple's memory fills up, A.E. PRO signals the host to pause (XOFF), writes the buffer to disk, and then directs the host to resume sending (XON).

Prices and specifications subject to change without notice.

ERROR FREE TRANSFERS

A wide range of send modes is provided. Everything from the simplest blind block dump, to a packet-oriented error checking mode ensures quick and easy error-free transfer of all sorts of data to practically any host computer. Even the slowest or most awkward systems are easily accommodated.

When two A.E. PRO's are used, you can SEND OR RECEIVE FILES OF ANY TYPE OR SIZE with complete error checking.

POWERFUL MACRO SYSTEM

A.E. PRO supports up to 26 complete macro libraries (remember, S.D.S. pioneered communications macros). Each library contains all macro strings and configuration parameters (baud rate, duplex, parity, etc.) unique to a specific host.

With A.E. PRO's macro facilities you can, with simple keystrokes, direct it to automatically call another computer, connect, and perform complete log-on sequences, virtually instantaneously.

SOPHISTICATED TERMINAL EMULATION

With A.E. PRO, your Apple can "mimic" the display characteristics of many popular terminals, including ADDS, Data General, DEC, Hazeltine, HP, IBM, Lear Siegler, Soroc, Televideo, and many others.

BUILT-IN TEXT EDITOR

A.E. PRO contains a versatile built-in text editor that can easily create or manipulate text. In fact, this editor is more flexible in many respects than some being touted as "word processors". It provides the ease of use of a line oriented editor, with the line editing power of many screen oriented editors, and will process files of up to 35K in size!

RELIABLE UNATTENDED OPERATION

A.E. PRO allows completely unattended answer mode with password protected log-on. In this mode, the caller can remotely send or receive files of ANY type or size.

A.E. PRO can also function as an answerback DDD or TWX node to forwarding mail systems such as Telenet's Telemail, and many others.

A.E. PRO is a member of a family of programs, which include P-TERM "The Professional"™ for Apple Pascal and Z-TERM "The Professional"™ for Apple CP/M™. All three packages share many of these powerful features and operate nearly identically.

For more information write or call us for your free copy of our product catalog and software comparison guide, which include detailed information on all "The Professional"™ series software.

A.E. PRO and other "The Professional"™ series packages are now in stock at local dealers everywhere.

Suggested Retail Price:

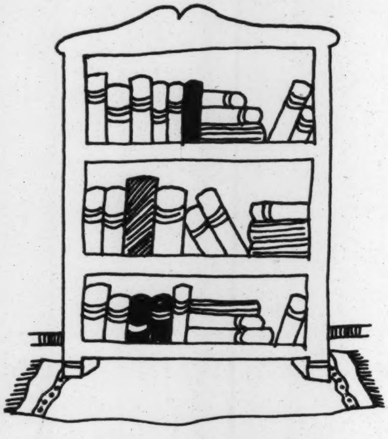
ASCII Express	**$129.95**
P-Term	**$129.95**
Z-Term	**$149.95**

southwestern data systems™

10761 Woodside Avenue, Santee, California 92071 (714) 562-3670

CIRCLE 285 ON READER SERVICE CARD

The Programmer's Guide to Programmer's Guides



George Blank

A major portion of any programmer's time is spent searching for information, trying to discover how something works, or even developing routines that are readily available elsewhere. A properly organized collection of the right reference manuals can increase his productivity substantially.

Some of the contents of the reference shelf are obvious. The programmer will want to organize the user's manuals that came with his equipment and systems software in order to have them within reach while programming. Space limitations will insure that the material that is seldom used will be moved to less valuable locations.

The most valuable reference guide I have is my own notebook. Whenever I write a subroutine, work out a procedure, or do any complex program, I write out the instructions, dump a listing, and file them in a notebook. Many of my programming friends do the same thing.

After that, there is a whole series of reference books that I consult. Many of them are incidental references, such as a programming text with some useful charts. Others are designed specifically to be used as reference handbooks. Since there are hundreds of references available, I will limit this review to software handbooks for popular systems.

George Blank, 239 Fox Hill Rd., Denville, NJ 07834.

The Basic Language

For most people, the best reference guide to Basic is the one that comes with their computer, or if Basic is not included, with their Basic. No general guide offers complete syntax for each computer. In my personal opinion, the built-in HELP command in TRS-80 Model III TRS-DOS from Radio Shack is better than a book. It gives clear and complete syntax. Other disk operating systems have offered help features for a long time, but I consider Radio Shack's the easiest to use and most complete.

The most valuable reference guide I have is my own notebook.

The best selling reference guide for Basic is David Lien's *The Basic Handbook*. The newly revised 2nd edition is greatly expanded, and now covers more than 250 dialects of Basic. The book describes Basic operators, commands, and functions one at a time, giving the purpose of the word, a test program and a sample run to see if it is implemented on your computer, variations in usage and alternate spellings on different computers, subroutines that you can use if you do not have the function in your Basic, and cross references to related functions.

This 480-page book is most useful to programmers who are converting programs from another computer dialect to their own. It is also helpful for people who want a general reference to Basic, or who work in several different Basic dialects. The most serious limitation of the book is that it does not give enough information on the graphics features of different Basics to help in converting programs that use graphics.

Pascal

Pascal is less fragmented into different versions than Basic, so a handbook can serve a broader purpose. *The Pascal Handbook* by Jacques Tiberghien describes every symbol, reserved word, identifier, and operator for seven different versions of Pascal, including UCSD Pascal. The 180 entries, in alphabetical order like *The Basic Handbook*, give a definition, a syntax diagram, a semantic description, implementation details, and program examples. This book is

apple discount software

CALSOFT

Personal — Entertainment — Business

SOFTWARE

Low Discount Prices / 15 to 25% Discount off List Price
Fast Convenient Service / We ship same or next day
Large Selection of Software / Call or Write for our FREE Catalog!

We have all the latest software—ASK US!

ATARI, IBM PC, CP/M: send for FREE catalog!

***Call Toll Free:** (800) 423-5290 **In California:** (213) 991-9641*

AVANT-GARDE

		Retail Price	Our Price
Hi-Res Secrets		125.00	106.25
Hi-Res Computer Golf		29.95	25.45
Zero Gravity Pinball		29.95	25.45

BRODERBUND

		Retail Price	Our Price
Apple Panic		29.95	25.45
★ Genetic Drift		**29.95**	22.45
David's Midnight Magic		34.95	29.70
The Arcade Machine		44.95	38.20
Track Attack		29.95	25.45
★ Star Blazer		**31.95**	23.95
Labyrinth		29.95	25.45
★ Choplifter	**NEW**	**34.95**	26.20
Deadly Secrets	NEW	34.95	29.70
Serpentine	NEW	34.95	29.70

CAVALIER

		Retail Price	Our Price
The Asteroid Field		24.95	21.20
Star Thief		29.95	25.45
Bug Attack		29.95	25.45
★ Microwave		**34.95**	26.20

CONTINENTAL

		Retail Price	Our Price
★ Home Accountant		**74.95**	56.20
Home Money Minder		34.95	29.70
★ CPA Modules #1-4 (each)		**250.00**	187.50
First Class Mail	NEW	74.95	63.70

DATA MOST

		Retail Price	Our Price
Snack Attack		29.95	25.45
Thief		29.95	25.45
County Fair		29.95	25.45
★ Swashbuckler		**34.95**	26.20
Casino		39.95	33.95
Expand-a-Port		69.95	59.40
World Series Baseball	NEW	29.95	25.45
Missing Ring	NEW	29.95	25.45

EDU-WARE

		Retail Price	Our Price
Empire I World Builders		32.95	28.00
Empire II Interstellar Sharks		32.95	28.00
Rendezvous	NEW	39.95	33.95

GEBELLI

		Retail Price	Our Price
Firebird		29.95	25.45
Russki Duck		34.95	29.70
★ Horizon V		**34.95**	26.20
Neptune	NEW	29.95	25.45
Lazer Silk	NEW	29.95	25.45
Zenith	NEW	34.95	29.70
Phaser Fire	NEW	29.95	25.45

HAYDEN

		Retail Price	Our Price
Sargon II		34.95	29.70
Applesoft Compiler 3.3		175.00	148.75
★ Pie Writer		**149.95**	112.45

INFOCOM

		Retail Price	Our Price
Zork I		39.95	33.95
Zork II		39.95	33.95
★ Deadline		**49.95**	37.45

MICROSOFT

		Retail Price	Our Price
Adventure		29.95	25.45
Typing Tutor II		24.35	21.20
Olympic Decathlon		29.95	25.45
★ TASC Compiler		**175.00**	131.25

MUSE

		Retail Price	Our Price
Super Text 40/80		175.00	148.75
Castle Wolfenstein		29.95	25.45
Frazzle	NEW	24.95	21.20
Firebug	NEW	24.95	21.20

ON-LINE SYSTEMS

		Retail Price	Our Price
HI-RES Adventures 0-5			15% OFF
★ Cross Fire		**29.95**	22.45
LISA		79.95	67.95
LISA Educational System		119.95	101.95
★ General Manager		**219.95**	164.95
Threshold		39.95	33.95
Screen Writer		129.95	110.45
Screen Writer Professional		199.95	169.95
The Dictionary		99.95	84.95
Expediter II+		134.95	114.70
Jawbreaker		29.95	25.45
★ Mouskattack		**34.95**	26.20
Marauder		34.95	29.70
Ultima II		59.95	50.95
EPF IV		79.95	67.95
Frogger		34.95	29.70
Cannonball Blitz		34.95	29.70
The Artist		79.95	67.95
★ Laf-Pak		**34.95**	26.20
Pest Patrol		29.95	25.45

VISICORP

		Retail Price	Our Price
Visiplot		200.00	170.00
★ Visitrend/Visiplot		**300.00**	230.00
Visidex		250.00	212.50
Visiterm		100.00	85.00
★ Visicalc 3.3		**250.00**	193.75
Visifile		250.00	212.50

SENSIBLE

		Retail Price	Our Price
Super Disk Copy III		30.00	25.50
Multi-Disk Catalog		25.00	21.25
★ Sensible Speller		**125.00**	93.75
Image Printer	NEW	40.00	34.00

SIR-TECH

		Retail Price	Our Price
★ Wizardry		**49.95**	37.45
Knight of Diamonds		34.95	29.70

SOFTWARE PUBLISHING

		Retail Price	Our Price
PFS		125.00	106.25
PFS: Report		95.00	80.75
★ PFS: Graph	**NEW**	**125.00**	93.75

STONEWARE

		Retail Price	Our Price
DB Master		229.00	195.45
★ DB Master Utility Pak #1		**99.00**	74.25
DB Master Utility Pak #2		99.00	84.15
DB Master Stat Pak		99.00	84.15
Graphics Processing System		59.95	50.95

SIRIUS SOFTWARE

		Retail Price	Our Price
Gorgon		39.95	33.95
Sneakers		29.95	25.45
★ Epoch		**34.95**	26.20
Copts & Robbers		34.95	29.70
Beer Run		29.95	25.45
Hadron		34.95	29.70
The Joyport		74.95	63.70
★ Twerps		**29.95**	22.45
Snake Byte		29.95	25.45
Audex		29.95	25.45
Kabul Spy		34.95	29.70
Minotaur		34.95	29.70
★ Bandits		**34.95**	26.20
Escape from Rungistan	NEW	29.95	25.45
Lemmings	NEW	29.95	25.45
Jellyfish	NEW	29.95	25.45
Cyclod	NEW	29.95	25.45
Fly Wars	NEW	29.95	25.45

STRATEGIC SIMULATIONS

		Retail Price	Our Price
Cartels & Cutthroats		39.95	33.95
Computer Quarterback (2nd Ed.)		39.95	33.95
The Shattered Alliance		59.95	50.95
Computer Baseball		39.95	33.95
★ Operation Apocalypse		**59.95**	44.95
Southern Command		59.95	50.95
★ Napoleon's Campaigns		**59.95**	44.95
Road to Gettysburg		59.95	50.95
★ Pursuit of the Graf Spee		**59.95**	44.95
Guadalcanal Campaign	NEW	59.95	50.95
Cytron Masters	NEW	39.95	33.95
Galactic Gladiators	NEW	39.95	33.95
SEUIS	NEW	39.95	33.95
The Cosmic Balance	NEW	39.95	33.95

TG PRODUCTS

		Retail Price	Our Price
Game Paddles		39.95	33.95
Joystick		59.95	50.95
★ Select-a-Port		**59.95**	44.95

We also carry complete lines from the following companies:

ADVENTURE INTERNATIONAL
ARTSCI • ASHTON-TATE
AUTOMATED • BEAGLE
BUDGECO • CAL PACIFIC
HOWARD • INNOVATIVE
MICROLAB • MICROPRO
PENGUIN • PHOENIX
PICCADILLY • QUALITY
SENTIENT • SIERRA
SOUTHEASTERN • SUBLOGIC
SOUTHWESTERN • VIDEX
SYNERGISTIC • SYSTEMS PLUS

If you don't see it, Ask Us!

CALSOFT

346 N. Kanan Rd. #103
Agoura, CA 91301

***Call Toll Free:** (800) 423-5290 **In California:** (213) 991-9641*

We accept Mastercard & Visa (include # and Expiration Date), check, COD ($1.50 extra), or Money Order. California residents add 6% sales tax. Include $2.00 for shipping (UPS Blue Label $3.00, Canada $6.00, other foreign countries $10.00).

★ Sale prices are through October only! Prices subject to change without notice.

CIRCLE 130 ON READER SERVICE CARD

particularly useful for beginners in Pascal programming.

The *Beginner's Guide for the UCSD Pascal System* by Kenneth Bowles is more of a teaching manual than a reference guide. However, the chapters are logically organized, the headings allow the reader to find topics easily, there is a good index, and the examples are clear and adequate.

Fourteen appendices describe the implementation of UCSD Pascal on different systems and terminals, summarize system commands, list error messages, and describe the differences between UCSD and standard Pascal. Anyone starting to use UCSD Pascal will find this book worthwhile.

CP/M

The popular CP/M operating system has a large number of commands and instructions. An excellent reference card is available free from *Microsystems,* a journal for CP/M and S-100 systems users. The CP/M Programmer's Reference Guide is a fold-out card that lists commands, PIP commands, parameters and keywords, control characters, assembler conventions and error codes, file types, DDT and Editor commands, IOByte functions, BIOS entry points, File control block, memory allocation, disk format, and BDOS function calls. *Microsystems* also offers similar free reference cards for Wordstar and Electric Pencil.

The *Osborne CP/M User Guide* by Thom Hogan and *The CP/M Handbook with MP/M* by Rodnay Zaks both combine material designed to teach the use of CP/M with reference material. I like the Hogan book better. It is more complete, uses less technical language, gives better explanations, and includes a good section on using popular high level languages and application programs with CP/M.

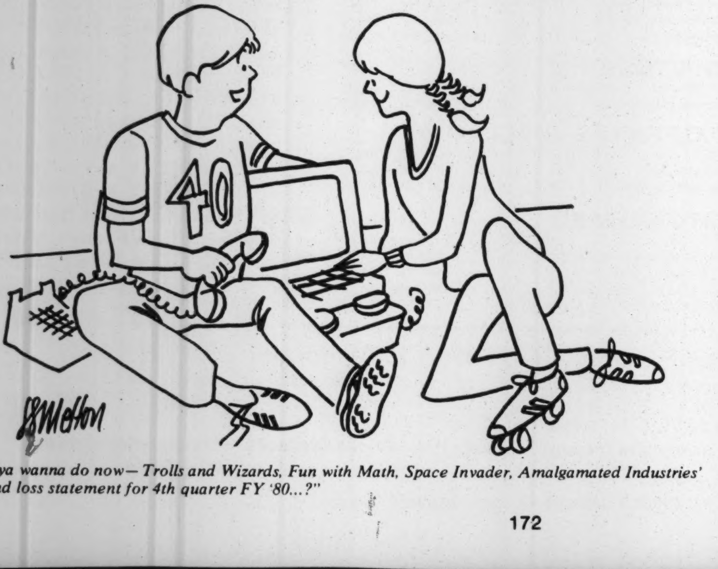
The Zaks book does have some advantages. It has a better layout, making it easier on the eyes and easier to find what you are looking for, and has a good set of appendices. Both books have decent indexes.

Apple II

Probably the handiest programmer's reference available is Computer Station's *Programmer's Handbook for the Apple.* This looseleaf binder has brief reference guides to Integer and Applesoft Basic, Pascal, Basic 80, Apple CP/M, 6502 Assembly Language, DOS 3.1, 3.2, and 3.3, the DOS Tool Kit, Applewriter, VisiCalc, Macro-Sced, Apple Plot, various printers, the Apple System Monitor, and hi-res graphics. Each reference is condensed to a few pages, and handy index tabs make the section you want easy to find. The binder is sturdy, and has plenty of room for your own notes.

Since this book, unlike Apple's spiral bound notebooks, is labeled on the edge and easy to find, most of the time I can find the information I need here in seconds instead of spending minutes to figure out which manual I need, trying to find the right manual, then trying to find the information I need. The material is condensed, and does not replace all other Apple reference manuals, but it is the first place to look for most questions about the Apple.

An eccentric but useful reference guide for Apple II owners is Wozpak II.



"Waddaya wanna do now—Trolls and Wizards, Fun with Math, Space Invader, Amalgamated Industries' profit and loss statement for 4th quarter FY '80...?"

The *Apple II User's Guide* by Lon Poole and others is primarily tutorial, giving instruction in operating the Apple II, Basic programming, using the disk, Apple graphics, and using the machine language monitor and mini assembler. This is followed by 100 pages of reference material. There is a list of Basic statements and functions, a list of formulas for derived numeric functions, lists of editing commands, error messages, intrinsic subroutines in the ROM, useful PEEK and POKE locations, reserved words, and character codes. Memory usage and disk formatting is explained, and extensive conversion tables are included for hexadecimal/decimal number base conversion.

While the *Apple II User's Guide* is not laid out to give information at a glance, it does have a good index, and a great deal of good information, presented in a form that is easy to understand. Although there are a few technical errors, it is practically a must for Apple programmers. I consider this and its PET/CBM companion the most useful of all the books in this review.

Programmers working with DOS routines will find *Beneath Apple DOS* by Don Worth and Pieter Lechner, a valuable reference. It offers clear explanations, well illustrated, with detailed comments, on how Apple DOS works, how the diskette is organized and formatted, using DOS from assembly language programs, customizing DOS, and a breakdown of the logic of DOS by memory address in detail. There are several handy program listings, including utility programs for dumping tracks, updating diskettes, reformatting a single track, and binary file to text file conversion.

An eccentric but useful reference guide for Apple II owners is *Wozpak II* from the Apple Puget Sound user group. The primary limitation of this material is that it applies to Integer Basic only, and is of little use to Apple II Plus owners.

It contains a large number of useful assembly language routines to renumber, append, relocate, cross reference, and recover programs and pack, load, generate, and edit graphics. The Apple floating point arithmetic routines and the TED editor are explained, along with several other articles. Serious Apple assembly language programmers should have this book. The user

The Aliens are on the way!

The aliens are restless. They've broken out of their own solar systems and are heading toward Earth — at faster than light speeds. These war-happy aliens are diabolically clever, inhuman fighters who give no quarter to man, ship or planet.

To preserve the peace of the galaxy, Earth needs a superior breed of spaceship pilots — fearless, yes, but more importantly each must have an intuitive sense of battle tactics as well as superquick reactions.

To identify these superior humans, Earth's master computer designed an ingenious battle simulator. And you are one in a million chosen to be tested.

As a Space Kadet, your training is intense, rigorous, professional and takes place on the sophisticated space battle simulator. It tests you in various battle skills: Instantaneous identification of the strengths and weaknesses of alien spacecraft. The proper construction and maintenance of force shields during attacks. Quick reactions and strategic planning under actual battle conditions.

Do you have the agility and intelligence to meet and defeat the cunning aliens? Can you graduate from Space Kadet to full fledged officer in the Space Patrol?

Hurry. The aliens are coming. And the simulator awaits.

For 1 or 2 players. (Keyboard)

Another sensational Hi-Res game by Dan "Snack Attack" Illowsky. Only $34.95 for the Apple II. At your dealer, or

DATAMOST

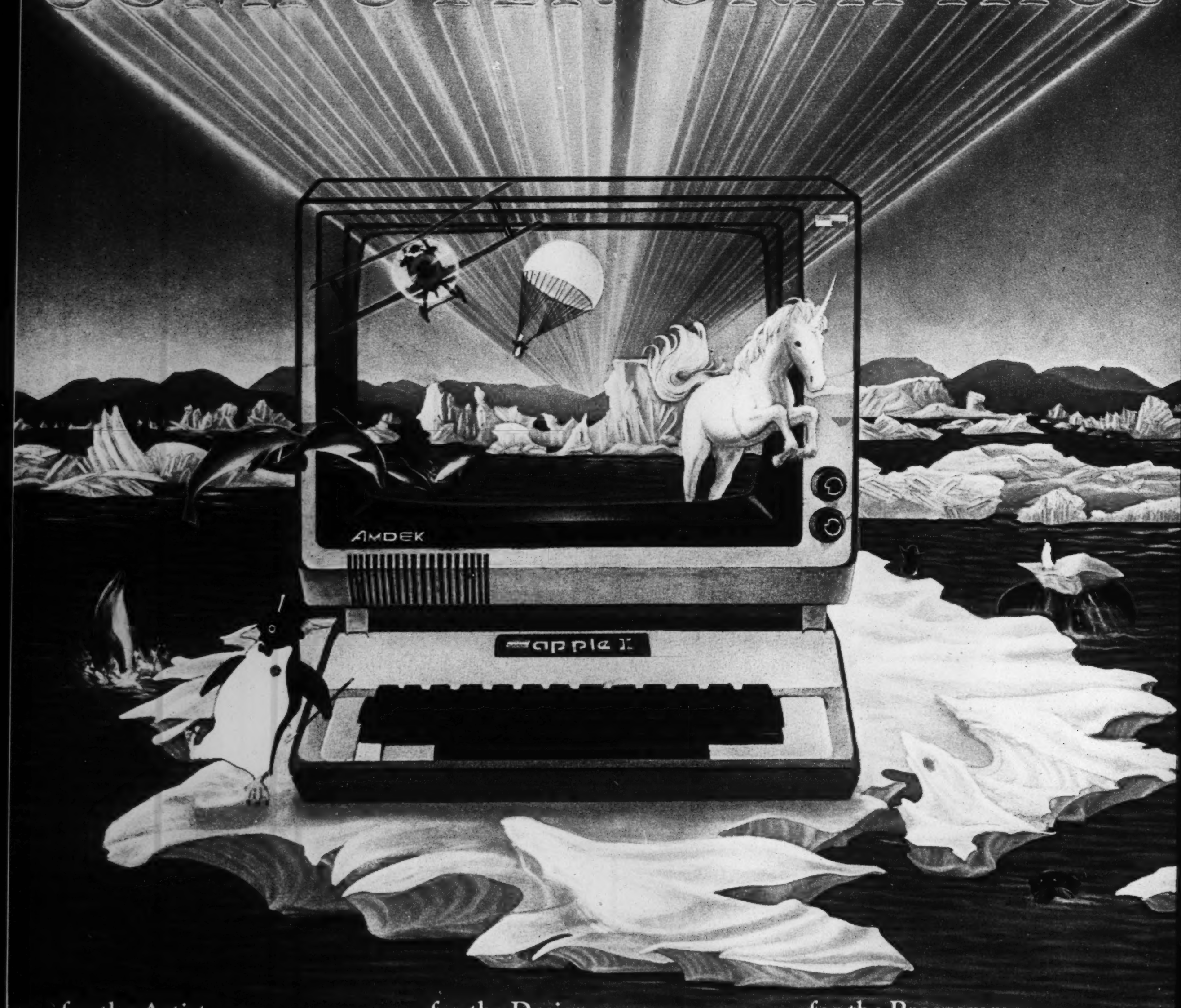
9748 Cozycroft Ave.
Chatsworth, CA 91311
(213) 709-1202

CIRCLE 162 ON READER SERVICE CARD

Apple is a trademark of Apple Computer

SPACE KADET

COMPUTER GRAPHICS



for the Artist

Special Effects

by David Lubar and Mark Pelczarski

Paint on your computer in over 100 colors with 96 different brushes! Magnify mode for precision touch-ups; mirror image; color reverses; move any part of picture anywhere; packing routine for increased disk storage of any standard graphics screen. Can be used by anyone. Paddle/joystick $39.95. Apple Graphics Tablet $69.95.

for the Designer

THE COMPLETE GRAPHICS SYSTEM II

by Mark Pelczarski

Everything needed for computer-aided design. Easily draw and design in two or three dimensions, mix text and graphics freely, define shapes and create typefaces with unique character generator. Great for presentations, videotape displays, storing designs on disks, graphics for other programs, or just for experimentation. Paddle/joystick $69.95, Apple Graphics Tablet $119.95. 50 additional fonts, $19.95.

for the Programmer

The Graphics Magician

by Mark Pelczarski, David Lubar, and Chris Jochumson

Add fast, smooth animation and hundreds of pictures to your programs. Create animated shapes and draw paths; have up to 32 independently controlled figures on screen. Use a special palette of over 100 colors to create pictures and objects in highly compressed format. Easy to use, and includes a special programming tutorial. Has saved months in development time for several games already on the market. Paddle/joystick $59.95, Apple Graphics Tablet $69.95.

penguin software 830 4th Avenue, Geneva, Illinois 60134 (312) 232-1984

All Penguin applications products are now on unprotected disks for your convenience. Apple II is a trademark of Apple Computer, Inc.

CIRCLE 244 ON READER SERVICE CARD

group also publishes *CALL A.P.P.L.E.* magazine, and offers bound volumes of the magazine with indexes each year that contain a great deal of useful Apple reference material.

Programmers using the Apple Pascal system will find *Apple Pascal,* by Arthur Luehrmann and Herbert Peckham to be very helpful, but not a substitute for the *Pascal Handbook.* Luehrmann and Peckham write "this book is a dismal failure as a reference manual" (page 359) and then describe what a proper reference should offer. That description matches the Tiberghian book mentioned above. Despite the disclaimer, the book has a good index and clear explanations that are written specifically for the Apple.

What's Where in the Apple by William Luebbert is the best general reference to the contents of the various memory locations in the Apple II. It consists of three parts; a general overview of memory, an "Atlas" listing contents by memory address, and a "Gazetteer" cross-referencing symbol names to their memory location. The listings are not easy to read, as they are reproduced from a dot matrix printer in upper-case only.

PET/CBM

Osborne/McGraw Hill publishes the comprehensive, 500 page *PET/CBM User's Guide.* Chapters cover operation, screen editing, Basic programming, special features, cassettes, diskettes, and the printer. There is a good index and extensive reference material, including memory maps to the various ROMs, lists of Basic statements and commands, error messages, character codes, and editing functions. Conversion tables and a list of CBM newsletters and reference manuals are among the many other features. This is an excellent reference book.

TRS-80 Model I and Model III

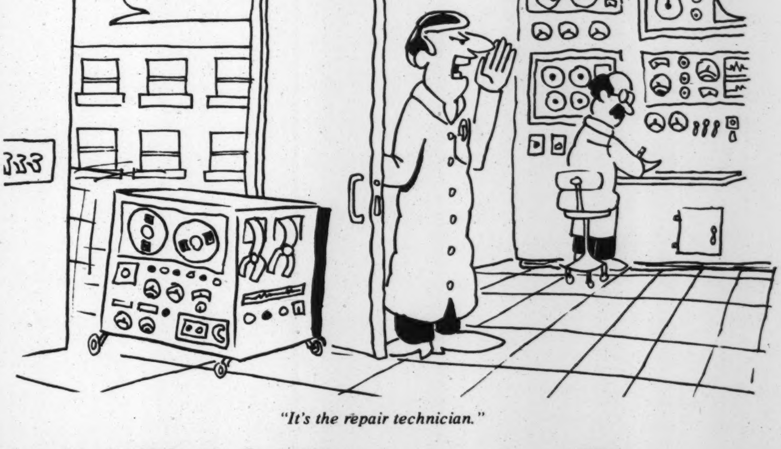
There are several reference guides to the TRS-80 ROM routines, including *The TRS-80 Disassembled Handbook,* volumes I, II, and III by Robert Richardson, *Supermap* by Roger Fuller, *Pathways through the ROM,* which I edited, *The Book,* volumes I and II from Insiders Software Consultants, and *Microsoft Basic Decoded & Other Mysteries* by James Farvour.

The most recent, most expensive, and best of the lot is *Microsoft Basic Decoded.* This 300-page book begins with an introduction to the organization of memory in the Model I and a brief explanation of what happens in many of the key memory areas, including the communications area, arithmetic and math routines, I/O drivers, system utilities and other functions.

Chapter 2 lists over 80 useful ROM subroutines which are explained and described so that the reader can use them from other programs.

Chapter 3 describes cassette and disk operation, while the next chapter explains many of the internal tables in the ROM. The next chapter gives an assembly language program to add a SORT function to Basic. This is followed by a program demonstrating overlays in the memory communications area. The last 250 pages of the book disassemble the ROM and give comments to explain what is happening.

Bob Richardson is an amateur radio enthusiast, and the three volumes of *The Disassembled Handbook for TRS-80* contain quite a few programs he has written, many of interest to Hams. *Pathways through the ROM* includes two of the other books; Volume I of the *Disassembled Handbook* and *Supermap.* It also has comments on the DOS memory locations, which are not found in any of the other books.



"It's the repair technician."

There are two additional sources of valuable information on Radio Shack TRS-80 Model I disk operation. *TRS-80 Disk and Other Mysteries* by Harvard Pennington is primarily a guide to using disk modification utilities like Superzap, RSM 2D, Monitor 3, DEBUG, and Z80-ZAP to examine diskettes, recover data, and correct problems. It is very technical, but the disk user who is willing to work hard can learn a great deal from this material.

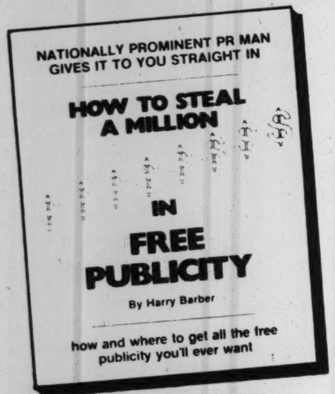
The other valuable disk reference is the *TRS-80 Model I Disk Interfacing Guide* by William Barden, Jr. This little 50-page booklet explains how a disk drive works, describes the Shugart disk drive and Western Digital controller chip used by Radio Shack, and gives and explains assembly language programs to boot, read, write to, and format a diskette.

This is the most helpful book available to assembly language programmers who want to write their own TRS-80 disk routines. However, assembly language programmers should be aware of the descriptions of DOS routines that are included in the Technical Reference section of Radio Shack's own DOS manuals. That information may be all that is necessary, and it was probably included with your disk system.

Atari

An excellent collection of simple Basic routines appears in *Atari Basic: Learning By Using* by Thomas Rowley. About two dozen programs illustrate graphics; sound; the use of paddles, joysticks, and special keys; as well as mixed modes; player missile graphics; and other special screen routines. Four short appendices cover key memory addresses, a player-missile memory map, building a display list, and calculating a screen position.

De Re Atari, from Atari, is a guide to the Atari computers for serious programmers. It gives a system overview, discusses and demonstrates display lists, character sets, player-missile graphics, display list interrupts and scrolling, then covers Basic, the operating system, and the disk operating system in detail. Nine appendices cover technical information, followed by a glossary. I would not recommend this book to anyone who did not have


NATIONALLY PROMINENT PR MAN
GIVES IT TO YOU STRAIGHT IN
HOW TO STEAL
A MILLION
IN
FREE
PUBLICITY
By Harry Barber
how and where to get all the free
publicity you'll ever want

This remarkable book shows you...

- **How to professionally prepare news releases and articles so they will be accepted by the media.**
- **How to develop your mailing lists.**
- **How to work with the news media.**
- **How to measure the effectiveness of your publicity**
- **Dozens of ways to secure additional publicity at nominal cost.**
- **Over 600 outlets for free publicity and reference to thousands of additional sources.**

In this comprehensive publicity guide, Harry Barber eliminates the mystique of "free publicity" shows you in detailed, step-by-step procedures, how and where to get it all the free publicity you'll ever want for yourself or your organization.

How To Steal A Million $ In Free Publicity is the ideal reference guide for business owners, corporate executives, political groups, non-profit organizations, and individuals in all walks of life.

About the author—
Nationally prominent advertising and public relations executive, Harry Barber, gives it to you straight in his latest book.

The author has developed hundreds of publicity campaigns in conjunction with screen and television personalities, US Astronauts, USAC Racing, major corporations, and private individuals.

Only $14.95 postpaid
SATISFACTION GUARANTEED!

Success Sellers
Publishers & Booksellers
P.O. Box 16801
Irvine, CA 92713

Please rush me a copy of Harry Barber's book, *HOW TO STEAL A MILLION $ IN FREE PUBLICITY*. I enclose $14.95.

Name ____________________
Address ____________________
City ____________________
State ____________ Zip ____________
CC-2

CIRCLE 296 ON READER SERVICE CARD

Guides, continued...

a working knowledge of assembly language, as it is quite technical, and a great deal of knowledge is assumed. The lack of an index makes it difficult to use for reference.

Several chapters of the book have appeared in *Byte* magazine, beginning with the September 1981 issue. In general, the *Byte* material is edited, easier to read, and better illustrated. The same topics have been covered in more detail and assuming less special knowledge in "Outpost: Atari," in the June 1981 through January 1982 issues of *Creative Computing*. These columns have been collected and revised and appear in *The Creative Atari* from Creative Computing Press.

More Information

The Basic Handbook ($19.95)
David Lien
Compusoft Publishing
1050 E. Pioneer Way Dept. CC
San Diego, CA 92119

The Pascal Handbook ($18.95)
Jacques Tiberghien
Sybex, Inc.
2344 Sixth St.
Berkeley, CA 94710

The Beginner's Guide for the UCSD Pascal System ($11.95)
Kenneth Bowles
Byte Books
70 Main St.
Peterborough, NH 03458

Microsystems
39 E. Hanover Ave.
Morris Plains, NJ 07950

Osborne CP/M User's Guide ($12.99)
Thom Hogan
Osborne/McGraw Hill
630 Bancroft Way
Berkeley, CA 94710

The CP/M Handbook with MP/M
($14.95)
Rodnay Zaks
Sybex
2344 Sixth St.
Berkeley, CA 94710

Programmer's Guide to the Apple II
($29.95)
Computer Station
12 Crossroads Pl.
Granite City, IL 62040

The Apple II User's Guide ($15.00)
Lon Poole
Osborne/McGraw Hill
630 Bancroft Way
Berkeley, CA 94710

Apple Pascal ($14.95)
Arthur Luehrmann &
Herbert Peckham
Byte Books
70 Main St.
Peterborough, NH 03458

Beneath Apple DOS ($19.95)
Don Worth & Pieter Lechner
Quality Software
6660 Reseda Blvd. Suite 105
Reseda, CA 91335

What's Where in the Apple ($14.95)
William F. Luebbert
Micro Ink, Inc.
34 Chelmsford St.
P.O. Box 6502
Chelmsford, MA 01824

PET/CBM User's Guide ($15.00)
Osborne/McGraw Hill
630 Bancroft Way
Berkeley, CA 94710

Disassembled Handbook for the TRS-80
Vol. I $10, Vol. II $15, Vol. III $18
Robert Richardson
Richcraft Engineering
Drawer 1065
1 Wahmeda Industrial Park
Chautauqua, NY 14722

Pathways Through The ROM
($19.95)
Edited by George Blank
Softside Publications
6 South St.
Milford, NH 03055

The Book: Accessing the TRS-80 ROM
Vol. I $14.95, Vol. II $17.95
Insiders Software Consultants
P.O. Box 2441
Springfield, VA 22152

Microsoft Basic Decoded and Other Mysteries ($29.95)
James Farvour
IJG Computer Services
1260 W. Foothill Blvd.
Upland, CA 91786

TRS-80 Disk and Other Mysteries
($22.50)
Harvard Pennington
IJG Computer Services
1260 W. Foothill Blvd.
Upland, CA 91786

TRS-80 Model I Disk Interfacing Guide ($5.95)
William Barden, Jr.
80 Northwest Publishing
3838 South Warner St.
Tacoma, WA 98409

Atari Basic: Learning By Using ($9.95)
Thomas E. Rowley
Elcomp Publishing
53 Redrock Lane
Pomona, CA 91766

De Re Atari ($19.95)
Atari Program Exchange
P.O. Box 427
Sunnyvale, CA 94086

The Creative Atari ($15.95)
Creative Computing Press
39 E. Hanover Ave.
Morris Plains, NJ 07950 □

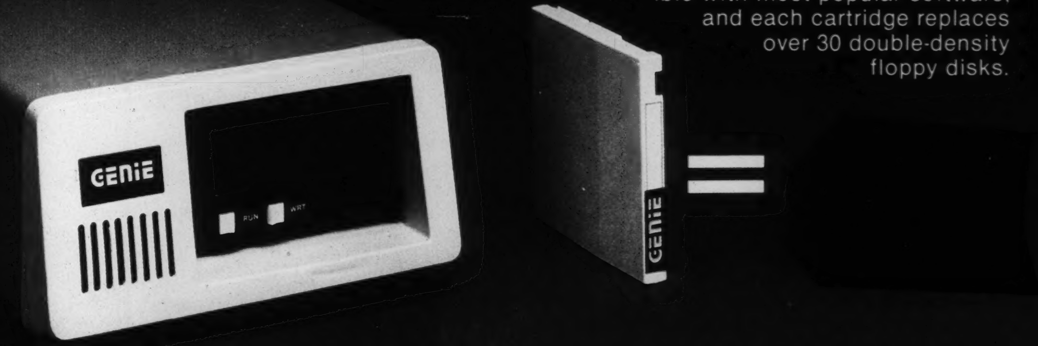
Introducing

GENIE® 5+5

5.25″ Fixed/Removable GENIE Cartridge Drives

I.B.M. • APPLE II • RADIO SHACK

The Genie Cartridge Drive is a revolutionary new 10 Megabyte Hard Disk Drive that includes a 5 Megabyte removable cartridge. The cartridge Drive system simply plugs into your computer, and includes all necessary software and hardware. Genie drives are compatible with most popular software, and each cartridge replaces over 30 double-density floppy disks.



FEATURES

- 10 Megabytes of on-line storage.
- File sizes to 5 Megabytes.
- Power-on self-test.
- Easy back-ups in minutes.
- System expandable to eight drives.
- Built-in error detection and correction.
- No preventative maintenance required.
- Comes complete with all necessary software and hardware.
- MTBF 8000 Hours.
- Built-in fan.
- Operates 110/220 VAC 50-60 Hz.
- One year limited warranty.

Removable Cartridge. Imagine, 5 Megabytes in the palm of your hand. These small cartridges are only .75 inches thick and 5.50 inches square. The disk itself is completely sealed from the outside and all its hazards by a sliding door that opens only once the cartridge is firmly seated inside the drive. Long term availability of this cartridge is assured by its adoption by several well known manufacturers including **Dysan,** the world leader in computer mass storage media.

Only **$3995.00***

Available at your local computer dealer

GENIE®

COMPUTER CORPORATION

31127 Via Colinas #802
Westlake Village, CA 91362
(213) 991-6210

*Manufacturer's suggested retail price. Includes all required components.
IBM Personal Computer is a registered trademark of IBM Corporation.
Apple is a registered trademark of Apple Computer, Inc.
Radio Shack is a registered trademark of Tandy Corporation.

VISA master charge

CIRCLE 177 ON READER SERVICE CARD

TRON

THE MOTION PIXEL SHOW

Computer-generated motorcycles line up for a deadly race.

Photos © MCMLXXXII Walt Disney Productions.
World rights reserved.

Mike Coffey

I have seen the future of American film. It is computer-generated and wondrously vibrant. *Tron* takes the viewer inside the incredible world of computer graphics.

Walt Disney Productions has issued the *Wizard of Oz* of the 1980s. The story is of a young man, abused in this world, who suddenly finds himself fighting for survival in another. The other world is not over the rainbow, but behind the video screen. The characters he meets are not tin men and scarecrows, but programs.

Like *Wizard*, *Tron* starts out on earth. Our man Flynn, played by Jeff Bridges, has written several video game programs. Corporate villian Dillinger, played by dressed-for-success David Warner, has copied Flynn's programs and erased the originals. Due to the success of "Space Paranoids," the best of Flynn's games, Dillinger has risen to the top of the corporate ladder at Encom, and has banished Flynn.

One night, Flynn returns to the Encom computer to regain credit for his programming work. Dillinger, however, has installed a Master Control Program to thwart such damaging infiltrations.

With the help of two friends, Flynn reaches a privileged terminal and begins hacking away at the computer's security system. The MCP, like Oz himself, becomes angry as Flynn challenges it with unsolvable problems, and treats us to a dazzling laser light show as it dematerializes Flynn and draws him inside the computer.

Flynn's journey into the computer, like Dorothy's flight to Munchkinland, transports the audience into a world never before seen. The computer world of *Tron* is made of imagination and electrons, instead of papier-mâché and polyfoam. Time is measured in nanoseconds, and matter can be converted into energy at the drop of a disk.

> ***Flynn's journey into the computer, like Dorothy's flight to Munchkinland, transports the audience into a world never before seen.***

The programs inside the Encom computer have all been enslaved by the MCP. The MCP has decreed that people do not exist and that programs who still believe in users must be punished. The presence of Flynn, a rogue user, within the computer can only upset this agnostic algorithmic society.

The imprisoned programs are held in prison sectors with invisible force fields instead of bars. Each program awaits the time when he will have to prove himself on the Game Grid, where video games are played to the death.

Flynn's first game is a round of computer jai-alai, in which two video-enhanced players whip a synthesized fireball at each other. Whenever the ball hits the ground, it knocks out a section of the floor. Eventually, one of the players falls through the floor to his death. Flynn wins this game, but refuses to finish off his opponent. The MCP and Sark, his righthand man/program, become further enraged at this display of mercy and kill the loser anyway.

Next, Flynn must enter the light Cycle race/duel. Each player rides a motorcycle dragster that leaves a solid color wall in its wake. These cycles are computer generated, three-dimensional, blindingly quick, and impossibly agile. The bikes can make right angle turns at top speed.

The object of the game is simple: survive. Running into a wall made by a cycle results in instant dematerialization. Flynn and two others, Ram and Tron,

Sark holds a deadly disk.

With Sark and the MCP hot on their heels, our heroes finally reach the i/o tower and learn the secret that will enable them to humble the master program.

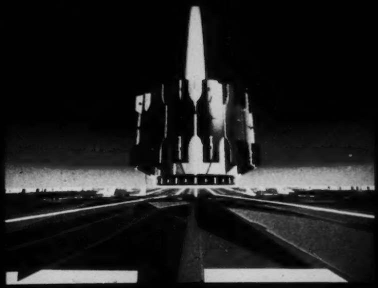
survive the race and manage to escape the Game Grid.

Flynn now joins forces with Tron, a creation of one of Flynn's friends in the real world. Tron and his creator are both played by Bruce Boxleitner. Tron's goal is to run independently of the MCP and to keep track of all interactions with other computers. Naturally, MCP discourages this, since his plans include stealing secrets from the Pentagon computer.

Flynn, Tron, and Ram begin a journey toward the input/output tower, where Tron must receive instructions from his user. Sneaking past armored tanks and hijacking a police vehicle, they make their way resolutely toward the tower as if toward the Emerald City.

Along the way, they meet a lovely female program played by Cindy Morgan, who also plays one of Flynn's real-life friends. Tron and this female seem to share a digital love relationship which causes Tron to react with jealousy when Flynn seems to recognize her. Anyway, she replaces the now deceased Ram in the traveling party.

With Sark and the MCP hot on their heels, our heroes finally reach the i/o tower and learn the secret that will enable them to humble the master program. They ride a solar simulator into the central part of the great computer where the final battle must be fought.



The i/o tower.

A great electronic frisbee fight ensues, with Sark the first to fall. The battle lasts for several minutes before the good guys prevail and Flynn returns to the world of humans.

As the master is deprogrammed, a new light dawns on the computer world. Everything begins to glow in a fresh, new way and glorious sounds fill the air. All the programs run for their towers to communicate with their users once again.

Judgment

Though not a great example of film literature, *Tron* succeeds mightily as a computer graphics demo. The story is strictly Saturday matinee material, and the characters are shallow stereotypes like those found in TV situation comedies. However, for 16 quarters, I may return to see it several times.

The dialogue is peppered with computer in-jokes. As a former big-computer user and big-company employee, I enjoyed the rebellious anti-establishment flavor of the story. As a sometime programmer, I enjoyed hearing programs talk about users as if they were gods.

The great achievement of the film is the creation of a new world. The inner space environment is easily as convincing as the outer space environments of Kubrick or Lucas. It seems that the nightmares of the video game addict have been realized on film.

The message that comes through strongest is that brilliant people can do powerful things with computers. Flynn was able to thrill countless people with his video games, and Dillinger enslaved an entire company with his control program. The animation compares favorably with most of the "conventional" animation I have seen. The backgrounds and transitions in *Tron* are better executed than those in many Academy Award nominees.

No coin-op or home computer video game comes close to the effects of *Tron*. All those other graphic miracles exhibit a flatness that *Tron* has transcended. In my eyes, *Tron* makes *Close Encounters of the Third Kind* look like *Casablanca*.

The images found in *Tron* are close to the best available from computers anywhere. Some day, all computer games will have similar quality animation. If you want a preview of future film or future gaming, see *Tron*. ☐

DISCSAVERS

VINYL PROTECTIVE DISK SLEEVES

Projections
DISCSAVERS
Color Protective Disk Sleeves
Receivables
Personal
Utility

COLOR CODED: Multi-color DiscSavers™ are designed for easy recognition of individual disks with your own color-keyed filing system. Ideal for office or home use.

PROTECTIVE: Custom grain vinyl provides added protection for magnetic disks by guarding against common handling hazards.

ATTRACTIVE: DiscSavers provide a handsome and professional method of single disk storage and enhance the look of your hardware while protecting your valuable software.

DURABLE: Rigid vinyl construction protects against constant handling to ensure long wear and tear.

PORTABLE: DiscSavers are the only portable vinyl disk sleeves for use with a single diskette that bear the RockRoy mark of quality.

Assorted Colors • 12 Per Box • $6.29.

ROCKROY INC.
Computer Products Division

7721 E. Gray Road
Scottsdale, Arizona 85260
(602) 998-1577
Toll-Free 800-528-2361

DiscSavers is a trademark of RockRoy Inc.

CIRCLE 229 ON READER SERVICE CARD

Pilot Tutorial I

M.R. Smith

This is the first of two tutorials designed to provide examples of uses of Pilot. Although it uses the Pilot-to-Basic translator which appeared in the October issue of *Creative Computing*, you can use it with other versions of Pilot. The tutorials are based on a workshop given at Calgary Teacher's Convention held in February 1982.

Type, Accept and Match

To type a message out to a student, the command TYPE (T:) is used before the message.

```
T:This lesson is on VOWELS

T:

T:What is your name?

T:
```

To make your screen easier to read, use T: without a message to print a blank line.

Once a question has been asked, the next step is to use the accept (A:) command to get the student's answer. The answer is automatically stored.

```
T:What is your name?

T:

A:

T:
```

The answer from the student can be compared against what was expected using the match (M:) instruction. You can check against one thing or many things.

```
T:Type in this word  FRED

A:

M:FRED
```

or

```
T:Give me a vowel

A:

M:A,E,I,O,U
```

The modify instructions Y and N allow the courseware developer to do things depending on whether or not the last match instruction was successful. To do this simply add Y or N after the instruction T:, A:, or M:. For example, testing the vowels again

```
T:Give me a vowel

A:

M:A,E,I,O,U

TY:Very good that was a vowel

TN:No that was not a vowel.
```

Using the Y and N modifiers you can check a series of things. For example, suppose you are making a lesson to check on the use of the Pilot instruction T:

Dr. Mike Smith, 304 86th Avenue SE, Calgary, Alberta, Canada T2H 1N7.

```
T:How would you get PILOT to write  WHO AM I
A:
M:T:WHO AM I
TY:RIGHT ON
MN::
TN:EACH PILOT STATEMENT MUST INCLUDE A COLON :
MY:T:
TN:THE TYPE STATEMENT MUST START WITH T:
```

In this short lesson, the first match instruction checked for the full correct answer. The second match instruction only occurred if the first match instruction failed. The third match instruction was made only if the second match succeeded.

The match instruction is both very powerful and very weak. For example, a single match instruction can be used to pick up any of the following words: yes, yep, yessir, yer, okay, OK, okey.

```
T:DO YOU UNDERSTAND?
A:
M:Y,OK
```

The Y in the match instruction will be matched against the Y in the other words, and the OK will be matched against even the misspelled word "okey." That is the powerful part. The weak part is that a match will also occur with the Y in the student's response NO YOU TELL ME.

To avoid this sort of problem, match against enough of the student answer to avoid this ambiguity but don't match against so much that the match instruction might not be able to spot a correct student answer.

For example using

```
M:YE,OK
```

would be good as it picks up the answers you want and ignores the one you don't want.

```
M:YES,OK
```

is poor. It marks some of the student responses incorrectly wrong.

Long Lessons

When building a very long lesson, many problems can crop up. The first is that you may not remember what each part of the lesson does. The second is difficulty in altering the way in which the student does the lesson. The first problem can be alleviated by documentation, and the second by splitting the lesson into parts.

The remark (R:) command is used to document things that the developer would like to remember. The student doing the lesson does not see the remark. It is simply a programming aid for the developer.

To break the lesson up into parts, use the lesson part (*:) instruction. The name of the lesson part is placed alongside the *:. At the very end of all the lesson parts the end (E:) instruction must be placed.

An example of these three commands is given below

```
*:LESSON 1
R:THIS IS A LESSON ON VOWELS
...
...
...
*:LESSON 1 PART 2
R:USING THE LETTERS BETWEEN A AND E
...
...
...
*:LESSON 1 PART 3
R:ETC.
...
E:
```

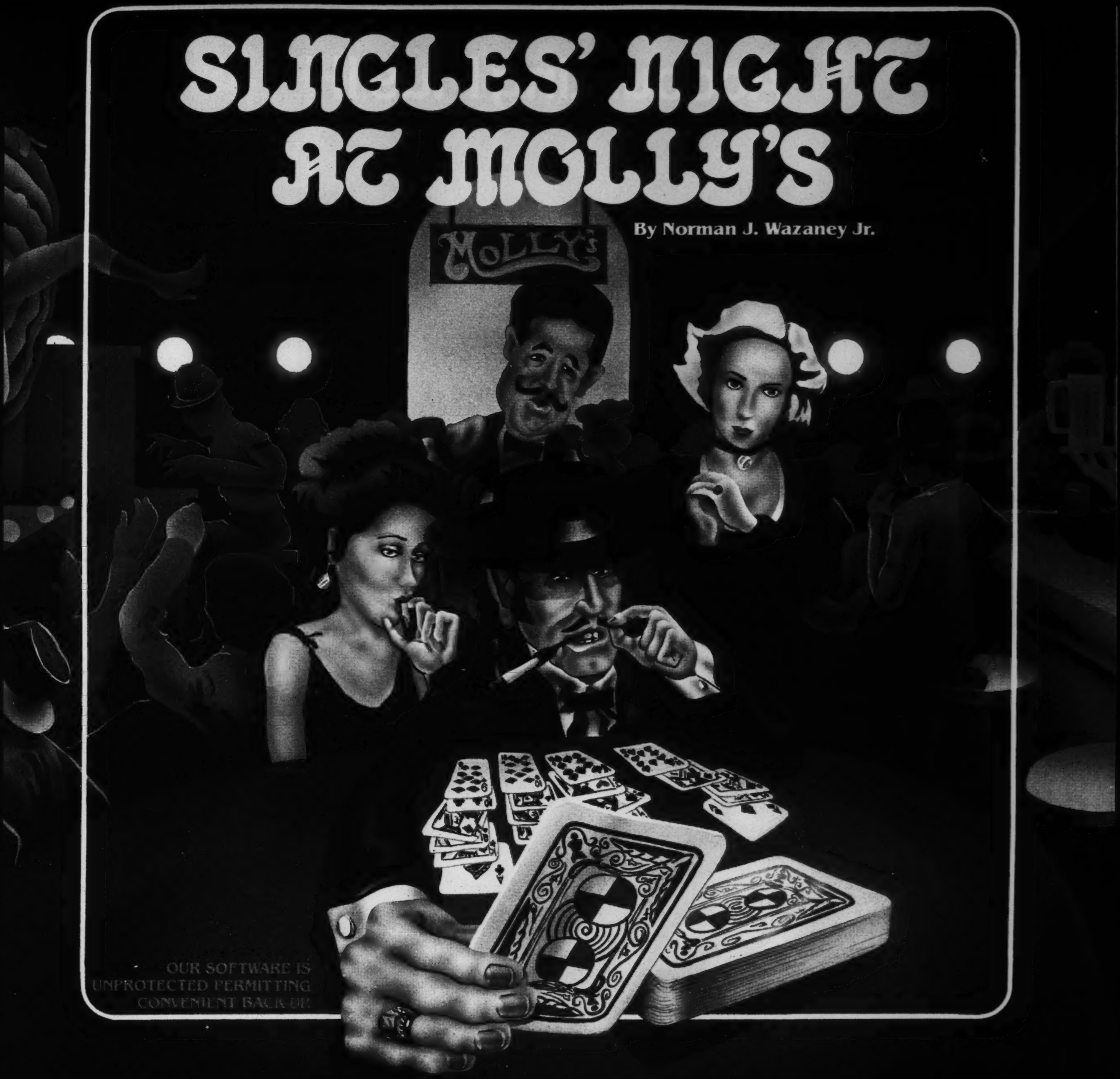
The jump (J:) instruction allows you to move about the program. For example, J:E allows you to jump to the end of the program and J:LESSON 1 PART 2 causes LESSON 1 PART 2 to be performed.

Using the jump instruction this way is rather restrictive. Instead the jump, match and accept instructions can be combined to move about the lesson according to what the student is doing. For example, this program shows the J: instruction being used to give the student a choice of lessons:

```
*:START
T:WHAT LESSON WOULD YOU LIKE?
T:VOWELS OR NUMBERS?
A:
M:V
JY:VOWELS
M:N
TN:ENTER VOWELS OR NUMBERS
TN:TRY AGAIN
JN:START
*:NUMBERS
R:LESSON ON NUMBERS
...
...
J:START
*:VOWELS
R:LESSON ON VOWELS
...
...
J:START
*:END
```

The first match/jump pair checks to see if the lesson VOWELS has been chosen. The second pair ensures that the student typed in a valid answer. At the end of each lesson part, a simple jump instruction takes the student back to the start of the lesson for another choice of topics.

Part Two of the tutorial will appear in the December 1982 issue of *Creative Computing*. ☐


SINGLES' NIGHT AT MOLLY'S
By Norman J. Wazaney Jr.
MOLLY'S
OUR SOFTWARE IS UNPROTECTED PERMITTING CONVENIENT BACK-UP.

You never dreamed Solitaire could be so fascinating.

Solitaire in a saloon can be fun but it's better on your Apple*. Fair warning: if you get hooked on Solitaire, beware of this game! "Singles' Night at Molly's" is actually two basic solitaire card games with several variations permitting you to use the skill level and strategy you enjoy most. Play alone or against other players, where a rating system declares the winner. Features High Resolution color graphics, full user documentation and various scoring potentials.

There are hours, days, even years of pleasure to be derived from this intriguing game. Available now for only $29.95 at computer stores.

To order by phone, call 800-526-9042 and use your Visa or MasterCard. All shipments made the same day in which orders are received. To order by mail, add $1 for shipping charges and send your check to:
Soft Images, 200 Route 17, Mahwah, NJ 07430.

"Singles' Night" runs on 48K Apple II, Applesoft in ROM.
3.3 DOS/One Disk Drive

CIRCLE 277 ON READER SERVICE CARD

Soft images

*Apple is a registered trademark of Apple Computer Co.

Accounting Plus II™

Plus…

Software Dimensions announces three new modules for Apple II* users with Accounting Plus II—each designed with the same high standards and human engineering factors that have made Accounting Plus II so popular.

With **Invoices Plus** you can inventory items just by entering part numbers; easily invoice non-standard items and miscellaneous charges; place user-defined comment lines on the invoice; get twice as many line items per invoice; automatically generate multiple pages; specify individual invoice numbers or assign them automatically—and more.

G L Plus expands your financial reporting capabilities, including changes in your financial position, offering even more flexibility for your General Ledger module. Typical reporting features include Budget/Prior Months' Listing, Income Statements, Balance Sheets, Budget Variance Report, Comparative Reports, Source and Use of Funds.

Labels Plus offers a versatile label package that lets you maintain one or more mailing lists with up to 1,000 names each, as well as to access existing Vendor and Customer files easily; add, edit and delete names; sort and select; print mailing labels.

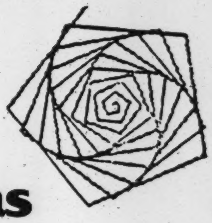
You won't find this kind of flexibility and sophistication in any other Apple II accounting system. To find out more, contact your Accounting Plus II dealer.

Software Dimensions Inc., 6341 Auburn Blvd., Citrus Heights, CA 95610. 916/722/8000

*Registered trademark of Apple Computer Inc. Accounting Plus is a trademark of Software Dimensions Inc.

© 1982 Software Dimensions Inc.

CIRCLE 279 ON READER SERVICE CARD



Logo Ideas

Robert Lawler

The Clever Hack and Clever Tactics

Two children played a simple Logo game, SHOOT. In that game, the turtle first draws a circle on the video display then, the pen is lifted and the turtle is set down at a random screen location. The objective of the game is to turn the turtle with RIGHT and LEFT commands until it points at the target then SHOOT the turtle forward into the target. When SHOOT is executed, it first moves the turtle forward the specified number of turtle steps. SHOOT next computes whether the turtle has landed within the circumference of the target. If so, a point is scored, the screen is cleared and a new round begins. Otherwise, the turtle is returned to its initial location and orientation.

This is a simple, low pressure game, used to familiarize new Logo people with the commands of the language. But with these two children taking turns at one terminal, the game quickly became competitive. It became important to score every time SHOOT was executed (they counted SHOOT executions as the basis of turn taking). One child noticed that the turtle always drew the target at the center of the screen. He also knew that the HOME command puts the Logo turtle at the center of the screen (and thus at the target center). He proceeded to score every time with the command sequence [HOME SHOOT 0], despite the outraged complaints of cheating from his opponent. This solution to the SHOOT problem is a clever hack. A "hack" is an accidentally effective way of getting around a particular problem.

The child's clever hack was easy enough to render ineffective. Someone else had only to change the game so that the turtle drew the initial target at another location for the clever hack to become worthless in itself. And yet, this clever hack served well as an example of a more general form of solution the child developed. He developed what he called a "clever tactic." Knowing that the SETHEADING command could point the turtle in a specific direction, he used SETH 0 then moved the turtle forward or back as necessary to align it horizontally with the target. A RIGHT or LEFT 90, with more forward and back commands would always then put the turtle within the target and permit SHOOT 0 to bring a certain score.

Summary

It is useful to distinguish between specific solutions to a problem in a particular circumstance and general solutions to all problems of a given class. Never despise the particular solution, however, for it can show the way to a more general and more powerful solution.

Robert Lawler, Centre Mondial Informatique Et Resources Humaines, Paris, France.

Advice To A Teacher

I write here about my own experience and out of that experience, but my situation is probably different from yours. You have had to worry about instructing 20 or 30 children. I have merely had to play with two children — and those children were my own whom I knew well. I write here also with the conviction that your work in the future will be more like my experiences than it has been. Computers will permit the construction of intellectual worlds where children will be able to spend much time learning effectively on their own. This will give you more time to know individual children and to intervene in their learning as the advisor you, their parents, and the children, themselves, hope you will be.

Geometry has been an important central theme of instruction in our laboratory because its founder invented a kind of geometry for children. We have called it "turtle geometry." It is distinguished from other geometries because it is a geometry of action. The leading actor, the agent of this action, is the turtle. Either a mechanical robot or a triangular cursor on a video display screen, the turtle goes forward some distance or turns through an angle on command. When its pen is down, the turtle draws a line.

At the ages of six and eight, my children were introduced to SHOOT, a simple turtle geometry game. A setup procedure drew a target and placed the turtle at some random screen location. To score, the children had to turn the turtle right or left some angle to point it at the target then SHOOT forward some distance into the target. The game was easy for them to play and they enjoyed it. (They even played the game without the computer; setting a hula hoop on the floor for a target, the children took turns playing turtle and keyboard commander.)

Robby, the older child, came to want a more complicated game. He was fascinated by the air battles of World War II and asked me to make a game in which the targets would be airplanes. READY-AIM-FIRE (we called R.A.F.) satisfied him; even more, it engaged him. Robby spent the better part of an entire day trying to score more kills than von Richthofen, the famous Red Baron of World War I. This game permitted him to do something he wanted — play in his own fantasy world. It permitted me to introduce him to absolute coordinate geometry.

The AIM procedure required specification of the location of the airplane through naming its X and Y coordinates. (Axes provided a scale from which these values could be read.) After the location of the plane was specified, the AIM procedure moved the "gunsight" to the location. AIM could be executed as many times as necessary to get the gunsight on target, where FIRE would destroy the plane and increase the score. When Robby later wanted a similar game for sinking ships, I showed him how to modify the R.A.F. procedures so that he could replace the gunsight with a sub and the airplane with a carrier, both simple drawing procedures he had created.

The style of introduction presented in this story is opportunistic in the extreme. It depends on three things: the inclination of the child to connect his computer activities with what he knows about other things that concern him; the flexibility of computer systems to enable the building of simple models; the knowledge and values of a teacher in shaping particular procedures through which the child's objectives are achieved in such a way that he is introduced to important ways of looking at and describing the world. □

The Countess And The Computer Language

Part One

Geoff Gilpin

Picture courtesy of Camelot Publishing Company.

This is the first of a three-part series on Ada. The first two parts comprise a tutorial on the language. The third is a comparison of two implementations of Ada for the Apple. Read on. The Countess is waiting.

Imagine that you are a computer programmer working for the Air Force. While assigned to the Cruise Missile Project, you come up with an especially clever program that makes the guidance system of the missile more accurate. You show the program to your boss who claps you on the back, gives you a raise, and then says:

"Hey, I just remembered—the Navy has cruise missiles too. Why don't you show them your program?"

So you walk across the street to see your friend Al, who works in Navy Data Processing. Al is very enthusiastic, but there is a problem: your program is written in Fortran and all of the Navy's programmers use assembly language. Since the Pentagon is interested, however, you and Al take several weeks from your jobs and translate the new program from Fortran into assembler, wasting a great deal of the taxpayers' money and seriously straining your friendship.

Now take the above scenario, multiply it by a thousand, spread it over decades, and you will begin to hear a clamor of tongues babbling away in military computer systems.

In 1975, the Department of Defense decided that this Tower of Babel had been built high enough. They formed the United States High-Level Language Working Group (whew!) to design a single language to be used as a standard among all branches of service. We now have the result of their labors—Ada, the universal language of the eighties.

Ada is named after Augusta Ada Byron, Countess of Lovelace, the nineteenth-century British noblewoman who worked with early mechanical computers. She is widely accepted as the world's first programmer and is regarded as a patroness by some members of the profession.

Geoff Gilpin, 1018 N. Leminwah St., Appleton, WI 54911.

Ada (the computer language) comes into the world propelled by enormous political and economic forces. When you apply for a job five years from now, your prospective employer will ask you if you know Ada, just as they ask about Fortran and Cobol now. This makes me very happy because I am a big fan of Ada (both the Countess and the computer language). I am here today to let you in on the ground floor, to give you a head start with programming in Ada.

When you apply for a job five years from now, your prospective employer will ask if you know Ada.

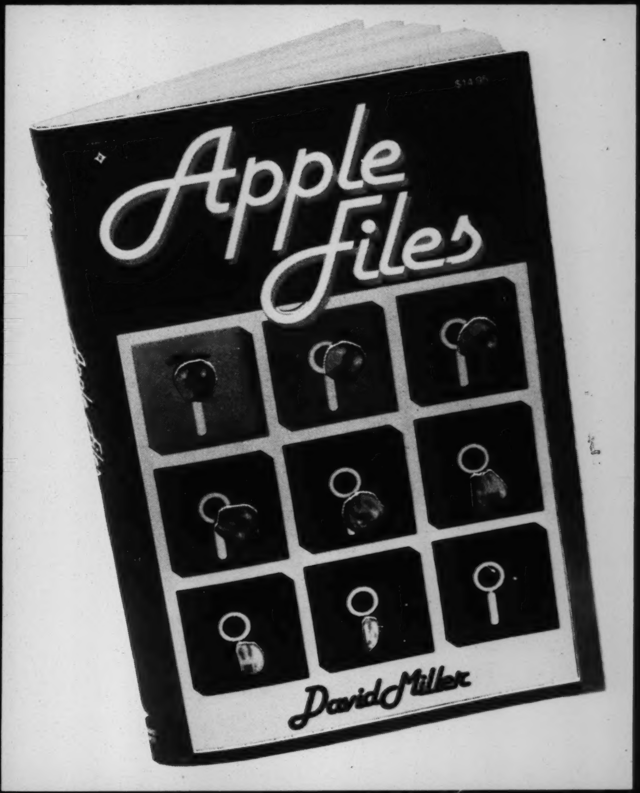
But first, a disclaimer: What follows is a description of the Ada language itself. Details concerning the creation, maintenance, and execution of Ada programs will vary between computer systems and are not discussed here. I am also assuming that the reader has some familiarity with at least one high-level "structured" language such as PL/1, C, Pascal, or even structured Cobol. Beyond that, things will be very basic. So, are we ready?

Here is a genuine Ada program, ready to run on that hot little microcomputer you have:

```
with TEXT_IO; use TEXT_IO;
procedure FIRST_EXAMPLE is

begin
put ("The Countess of Lovelace welcomes you!");
end FIRST_EXAMPLE;
```

This is a trivial little program that will, when compiled and executed (see your manual), print Ada's greetings on your terminal (or printer or whatever your "standard output device" is). Although trivial, this program has several things to teach us.

TAKES THE MISERY AND MYSTERY OUT OF USING THE APPLE'S* FILE STRUCTURE . . .



If you really enjoy programming and like the freedom of creating programs for your own use, you'll be happy to discover APPLE FILES.

This brand-new book is designed to eliminate the painstaking trial-and-error process that Apple users have to suffer through to learn how to use their computer's file structure.

No more misery and mystery — now this step-by-step tutorial shows you how to create and use virtually any type of file you want.

David Miller, author of APPLE FILES, is the well-known editor of Apple Educator's Newletter.

In this book, he makes it relatively easy for anyone — from beginner to experienced Apple user — to expand their programming capabilities.

Read what Ken Mazur (Microcomputer/Editorial Consultants) says about APPLE FILES:

" . . . this may be one of the best (books) I have ever reviewed. The author is clear, concise, and a marvelous teacher.

He shows concern for his readers and makes the effort (successfully) to anticipate reader problems . . .

He then explains in great detail any area of possible confusion . . .

An excellent (book). I would rate the quality of (Miller's) work right up there with David Lien, John Grillo, and J.D. Robertson . . .

Miller makes a possibly confusing subject extremely clear."

INVEST TIME NOW in learning how to get the most out of your Apple.

Let APPLE FILES help you unlock the mystery of your Apple's file structure and give you the unlimited freedom to change and add to your programs at will.

APPLE FILES is available at your local dealer, or order directly from the publisher: Reston Publishing Company, Inc., 11480 Sunset Hills Road, Reston, VA. 22090.

To order by phone, call toll-free 800-336-0338. In Virginia: 703-437-8900.

Send $14.95 for each book, plus your state's sales tax. MASTERCARD and VISA cards are accepted. SAVE! If payment, plus state sales tax accompanies your order, publisher pays postage and handling.

Available separately: a diskette of all the programs in the book.

RESTON PUBLISHING COMPANY, INC.

A Prentice-Hall Company
11480 Sunset Hills Road
Reston, Virginia 22090

*Apple is a registered trademark of Apple Computer Company

CIRCLE 265 ON READER SERVICE CARD

Procedures

First, Ada programs have names. The one above is called FIRST EXAMPLE. It is an instance of a *procedure*, a simple kind of program unit in Ada.

Procedures begin with the keyword "procedure" followed by an identifier, which is a unique combination of letters, numerals, and the underscore character. Ada adheres to the custom of beginning an identifier with a letter. Here are some examples of Ada identifiers:

```
X, x, Tl, Fred, day_of_week, ROTATE, abort_mission,

R97z33, oh_my_stars_and_garters
```

Obviously, meaningful names are better.

Procedures in Ada don't operate in a vacuum; they live in a particular environment. The environment occupied by FIRST_EXAMPLE is, in part, defined by the statements "with TEXT_IO" and "use TEXT_IO." Just as the citizens of a particular country have certain privileges and responsibilities, Ada programs operating in a specified environment acquire the features and limitations of that environment.

Specifying "with TEXT_IO" makes all the features of the TEXT_IO package (more on packages later) available to FIRST_EXAMPLE. Specifically, these include other Ada procedures designed to move streams of characters between the computer and various peripheral devices (the terminal, for instance). The "put" statement invoked in the fourth line of the program is actually an Ada procedure contained in TEXT_IO. If we hadn't specified "with TEXT_IO," the put procedure wouldn't have been available to our sample program, which would have been deaf and blind to the outside world.

Notice that a blank line divides FIRST_EXAMPLE into two logically distinct parts. The top two lines are called the "specification," which gives the information needed to link FIRST_EXAMPLE up to its environment. The bottom three lines, called the *body*, lists the actions performed by FIRST_EXAMPLE when it is invoked.

The body of FIRST_EXAMPLE contains a single command, the "put" statement, bracketed by the "begin" and "end" statements which delineate procedure bodies (and the bodies of other program units such as packages). Notice that the name of the procedure must be repeated after the concluding "end." This helps to keep the boundaries of the procedure clear.

Second Example

Since our sample program was so simple, let's look at another example:

```
with TEXT_IO; use TEXT_IO;
procedure SECOND_EXAMPLE is

NOT_PRIME: Boolean;
TWO:       constant := 2;
NUMBER:    integer;
REPLY:     character := 'y';
MESSAGE_1: string (1..14) := "Lady Lovelace ";
MESSAGE_2: string (1..17) := "bids you farewell";

begin
put ("enter an integer and I will tell you");
put (" if it is a prime number.");

while REPLY /= 'n' loop    -- /= means "not equal to"
      get (NUMBER);
      NOT_PRIME := false;

      for i in TWO..NUMBER/TWO loop
          if NUMBER mod i = 0 then
             NOT_PRIME := true;
             end if;
          end loop; -- for loop

      if NOT_PRIME
         then put (NUMBER); put ("is not prime");
         else put (NUMBER); put ("is prime");
         end if;
         new_line;
         put ("do you want to do it again?");
         get (REPLY);
         end loop; -- while loop

   put (MESSAGE_1 & MESSAGE_2);
   end SECOND_EXAMPLE;
```

So far, Ada looks pretty conventional. In fact, you Pascal users may be having a sense of *deja vu*. This is not a coincidence; the Department of Defense used the Pascal language as a model in the design of Ada and, apart from minor syntactical differences, Pascal can be considered a subset of Ada. Pascal programmers will notice that semicolons are used more consistently here. As in PL/1, semicolons terminate rather than separate statements. Semicolons appear at the end of nearly all statements; the major exceptions being is, begin, and loop.

SECOND_EXAMPLE is one step above the first program on the simplicity scale. When executed, it will determine if numbers entered by the user are prime; although its real purpose is to give an appreciation of the general structure of Ada. We will take a quick look at it to familiarize ourselves with the basic syntax of Ada and then move on to new territory.

The data declaration section, immediately below the specification, introduces a few of the familiar faces from Ada's great cast of data types. Notice that TWO is declared a constant, a value which does not change during the execution of the program. Initial values may be assigned to data objects, as occurs with TWO and the character variable REPLY.

We could have specified the type *constant integer* for TWO, although the type is implied from the assigned value. If the value had been 2.0 instead of 2, TWO would have been of the type *float*.

DOCUWRITER I
ATTENDANCE
JOB COST
MEDICAL I
DENTAL

Dreams Come True

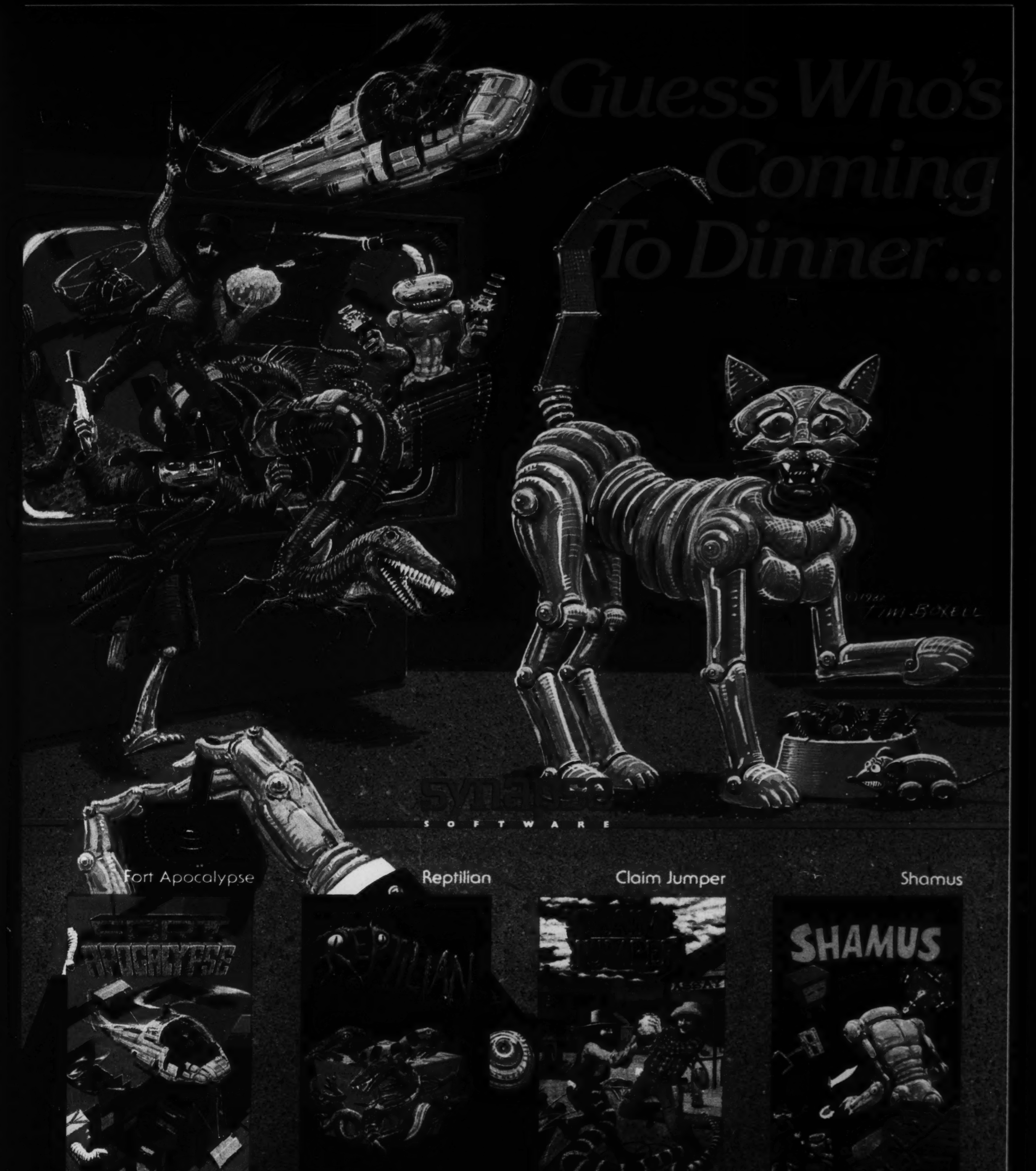
When you use Quality Software from CMA

APPLE II - APPLE /// - TRS-80 - IBM

CMA

Micro Computer Division
55722 Santa Fe Trail
Yucca Valley, CA 92284
(619) 365-9718

CIRCLE 132 ON READER SERVICE CARD



Guess Who's Coming To Dinner...
©1982 Tim Boxell
synapse
SOFTWARE
FORT APOCALYPSE
REPTILIAN
SHAMUS

Fort Apocalypse

Reptilian

Claim Jumper

Shamus

Fort Apocalypse, Reptilian, Claim Jumper and Shamus are all trademarks of Synapse Software,

5327 Jacuzzi St., Suite I, Richmond, CA 94804 • (415) 527-7751

CIRCLE 298 ON READER SERVICE CARD

For the Atari Home Computer

Atari is a registered trademark of Atari, Inc.

"TI's Home Computer. This is the one."

A lot of computers offer a lot. Only one in its price range offers the most. The TI Home Computer.

Better to begin with. Anyone can start right away with our Solid State Software™ Command Cartridges. Dozens of programs are available in home management, education and entertainment.

Easy to expand. Our Peripheral Expansion System gives you plug-in cards for memory expansion, P-Code capabilities, a disk drive controller and the RS232 Interface. You can also add a modem, speech synthesizer, disk drive and 80 column dot matrix printer.

Programming flexibility. TI BASIC is built into the Home Computer. But it can also handle TI Extended BASIC, UCSD Pascal* Version IV.0, TI LOGO II, TMS 9900 Assembly Language and TI PILOT. Programs can be stored in the optional Mini Memory Command Cartridge.

High-Tech specs. 16-bit microprocessor, 16K bytes RAM (expandable to 52K). 26K bytes internal ROM, up to 30K bytes external ROM. 3 simultaneous tones from 110 HZ to 40,000 HZ. High resolution video. U. & l.c. Single line overlay for 2nd function. Control & function keys. 16 color graphics with 4 modes & sprites.

Sound impressive? Compare a TI Home Computer with the competition and really be impressed. You won't even need a computer to tell you this is the one.

TEXAS INSTRUMENTS

© 1982 Texas Instruments

*UCSD Pascal is a trademark of the Regents of the University of California

CIRCLE 303 ON READER SERVICE CARD

Next there are the two MESSAGE strings. Strings in Ada are declared as arrays, with upper and lower bounds specifying the number of characters the string may contain. There is no "dynamic length attribute" as in Basic—a 14-character string must hold 14 characters.

In the assignment of the MESSAGE variables, notice that the assigned strings are surrounded by double quotes as opposed to the single quotes used to assign the character value 'y' to REPLY.

The main part of the program is contained inside the *while* loop that starts after the third blank line. Here we meet our first Ada comment, which begins with the "—" marker and extends to the end of the line. There are no embedded comments as in PL/1 and Pascal.

After the get statement (also part of TEXT IO) comes the Ada version of the iterative for loop, which is the biggest departure from conventional syntax that we have seen so far. Instead of assigning upper and lower values to an index variable, Ada uses a *range*. Ranges occur all through Ada and can be specified in different ways.

The simplest way, illustrated here, is to put two constants, variables, literals, or expressions on either side of two dots, the lesser-valued one on the left. For instance, we might have

```
for j in 'a'..'z' loop    -- the alphabet is predefined
```

or

```
for HUE in RED..YELLOW loop
```

Although it is not obvious from the above fragments, loop counters, such as j and HUE, are not explicitly declared with the other variables in the program. When j appears after the for keyword it is implicitly defined as a variable of type character. An explanation of the second example, and more concerning ranges, will appear momentarily.

Examining the for loop and its inner if statement reveals that Ada handles block structure differently from other Algol-related languages. Compound statements must be explicitly terminated, as in "end if" and "end loop." Although this seems clumsy when the compound contains only one statement, I prefer it to the endless BEGIN-END blocks in Pascal and Algol.

Farther down, in the second if statement, we come to one of the genuine shortcomings of Ada. Notice the two put statements required to print NUMBER and a message string. Any other programming language (even Basic), would have allowed you to write "put (NUMBER, "is prime")." Not Ada. NUMBER is a number and "is prime" is a string and put will only accept one type at a time. This makes formatting output extremely difficult, a fact which may slow acceptance of the language by the business community. Fortunately, Ada is designed for easy expansion and better I/O facilities should appear shortly.

The & in the final put statement is a concatenation operator, used for glueing strings together. The output will be

```
        Lady Lovelace bids you farewell
```

with no surrounding quotes.

Control Structures

Before considering the more esoteric features of Ada, let's look at a couple of garden variety control structures.

Ada has a *case* statement which looks like this:

```
case NUMBER of
     when 0      => put ("NUMBER equals zero");
     when 1      => put ("NUMBER equals one");
     when 2|3    => put ("NUMBER equals two or three");
     when others => null;
     end case;
```

Notice the vertical bar used to separate alternative cases; the *others* clause used for cases not covered by the preceding *when* clauses; and the special *null* statement indicating that

Choose from the MOST COMPLETE LINE of VIC® software

CITY BOMBER / MINEFIELD
2 games: CITY BOMBER, the most addicting arcade-style game you've seen on a VIC! You have to bomb every building! MINEFIELD is a game of intense concentration, requiring keen logical thinking.
$23.95 cassette

BLACK HOLE
An exciting, difficult, original space game! The swirling Black Hole is constantly trying to draw you in; you also have dangerous space debris to avoid or destroy—if you miss, they are transformed into malicious space baddies out to get you! Great graphics and sound!
$34.95 cartridge only

EDUCATIONAL/RECREATIONAL I
2 programs: HANGMAN—try to guess the letters of a word. Every time you guess wrong, a cartoon character takes one step closer to being hanged! HANGMATH—try to guess the digits of a multiplication problem; a game of logic and deduction! Both with color and animated graphics.
$14.95 cassette

LOAN ANALYZER
Has Amortization tables, computes interest charges, compares various loans, analyzes loan terms, and can manipulate loan parameters!
$14.95 cassette / $19.95 disk

LOGIC GAMES PACKAGE
2 programs: CODE MAKER and CODE BREAKER based on the famous Mastermind game by Invicta. Has color, graphics, and sound!
$14.95 cassette

EDUCATIONAL/RECREATIONAL II
2 programs: MATH HURDLER—you are racing on a track where the hurdles are arithmetic problems! MONSTER MAZE—exploring a labyrinthian cave populated with monsters; makes a new maze every time!
$14.95 cassette

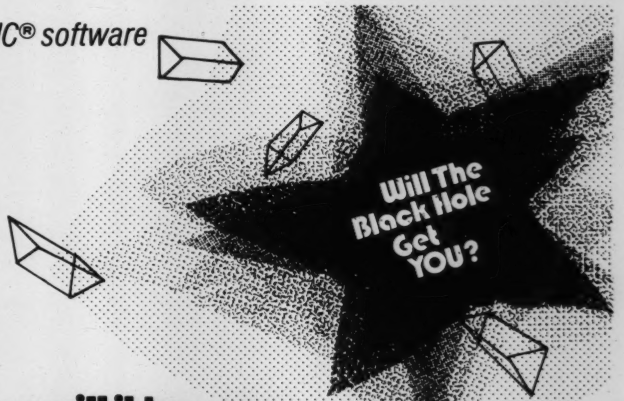
DECISION MAKER
Can help you decide between alternatives and it computes recommended choices. Will also manipulate decision parameters, weigh influencing factors and save decisions on tape or disk.
$19.95 cassette / $24.95 disk

CAR COSTS
Record maintenance costs, itemize insurance payments, track fuel consumption, summarize all costs to date as well as compute the cost of an individual trip.
$19.95 cassette / $24.95 disk

ACTION GAMES
3 games on 1 cassette: SEAWOLF, a submarine game with different levels of skills, sound, color, and challenge! BOUNCEOUT, a game of anticipation and reflexes—variable skill levels. VIC TRAP—you play against the VIC, trying to trap VIC, who automatically keeps a running score.
$24.95 cassette

HOME INVENTORY
Use it to catalog your possessions—it has user-definable categories. Record serial numbers, purchase prices, and other useful information, as well as computing the value of items.
$19.95 cassette / $24.95 disk

HOUSEHOLD FINANCE
16 income and expense categories plus budgeting, Monthly and Yearly accounting, keeps track of tax deductible items, produces graphs and tables.
$34.95 cassette / $39.95 disk



or will it be one of our WORKING VIC programs?

CREATIVE SOFTWARE
A Division of ASCI, Inc.

201 San Antonio Circle
Mountain View, CA 94040
(415) 948-9595

TO ORDER: VISA/MasterCard, check or money order accepted. If a charge, please include expiration date of card. Add $1.50 for shipping and handling. California residents add sales tax. *Ask about our many other recreational and home applications!*

nothing is to be done if NUMBER is greater than three or negative.

There is also a special *elsif* construct designed to take the messiness out of nested if statements, e.g.:

```
if    SCORE >= 90 then put ("grade: A");
elsif SCORE >= 80 then put ("grade: B");
elsif SCORE >= 70 then put ("grade: C");
elsif SCORE >= 60 then put ("grade: D");
                   else put ("grade: F");
end if
```

This lets us get by with a single "end if" and eliminates the dangling else that you sometimes see in languages like PL/1. By the way, out of 62 reserved words in Ada, *elsif* is the only one that is not genuine English.

So much for basic syntax. From now on, things begin to get very baroque very quickly.

If you want COLORS that can be RED, BLUE, and YELLOW, why settle for integers that can only be numbers?

Consider data types and structures. In addition to the types mentioned above, Ada has short integers, integers, and long integers; naturals and fixed point numbers; floats (three kinds) and reals—all of which can be altered *ad infinitum* through the use of various ranges, subtypes, and modifiers. (And those are just the numbers.) For instance, the declaration

```
NUM: integer range 1..10;
```

makes it illegal to assign NUM any value outside the specified range (which is handy for array subscripts.) If you are not happy with the integers that Ada gives you, you could declare

```
type MY_INTEGER is new integer;
```

which introduces user-defined data types (preceded by the keyword *type*), and derived types (specified by *new*). Now your integers can do everything that Ada's can, except mingle with other integer types. For example, the statement

```
X: integer;
Y: MY_INTEGER;

    ...

X := Y;
```

would produce an error message. This is because Ada is a "strongly typed" language. Variables of one type are totally segregated from those of other types. To get around this, Ada provides a conversion mechanism. The statement

```
Y := MY_INTEGER (X);
```

will take the variable X (an integer), convert it to the MY INTEGER type, and assign it to Y.

User-defined types do not have to be derived from the existing ones. If you want COLORS that can be RED, BLUE, and YELLOW, why settle for integers that can only be numbers? Instead, write

```
type COLOR is (RED, BLUE, YELLOW);
```

which permits declarations such as HUE: COLOR; and statements such as HUE := BLUE;. These new types are called *enumeration types* because the user must enumerate the values that variables of the type can have.

Sometimes we want to test whether a particular value belongs in the list of values of an enumeration type. This is called the *set membership* test and Ada provides a special *in* operator for the purpose. For instance, the declaration

```
type ADA_QUALITIES is (STRONG_MINDED,
                       FIERCELY_INDEPENDENT,
                       HAUNTINGLY_BEAUTIFUL);
```

allows us to test

```
if MEEKNESS in ADA_QUALITIES
    then put ("she was meek");
    else put ("no she wasn't");
    end if;
```

which will print the latter message.

There are many other data types in Ada, including *task* types (for concurrent programming), *private* types (for hiding data), and *access* (pointer) types. Are you getting the idea that Ada is *big*? You are right. Now on to data structures.

Data Structures

Ada has arrays, of course, which are declared like this:

```
MATRIX: array (0..100, 0..100) of Boolean;
```

Now we can write conventional assignments like MATRIX (1,3) := true;.

The index type (which in MATRIX is integer) and the element type (Booleans in MATRIX) don't have to be the predefined varieties. Thus, if we declare

```
type BEATLE is (John, Paul, George, Ringo);
type INSTRUMENT is (guitar, drums);
```

we could also declare

```
PLAYS: array (BEATLE) of INSTRUMENT;
```

and then assign

```
PLAYS(Ringo) := drums;
```

Arrays may be initialized at the time of their declaration.

```
PLAYS: array (BEATLE) of INSTRUMENT := (guitar, guitar,
                                        guitar, drums);
```

In this example, the value "guitar" is assigned to the first three components (John, Paul, George) of the PLAYS array, and the value "drums" to the last (Ringo). The same thing could be accomplished in an assignment statement:

```
PLAYS := (guitar, guitar, guitar, drums);
```

The index value may be explicitly named in the assignment:

```
PLAYS := (George => guitar,
          Ringo  => drums,
          Paul   => guitar,
          John   => guitar);
```

This example has the same effect as the previous two. Notice that when index values are named they do not have to appear in any particular order. (Also notice the use of the "=>" symbol rather than the assignment operator.) Finally, there is a shorthand form:

```
PLAYS := (Ringo  => drums,
          others => guitar);
```

This kind of explicit list of array components is called an *aggregate*. There are many ways of forming aggregates in Ada.

Another familiar data structure is the *record* which, unlike arrays, must be declared as a separate type.

```
type CLIENT is record
               NAME:     string (1..25);
               AGE:      integer range 1..100;
               BANKRUPT: Boolean;
               end record;

PERSON: CLIENT;
```

Individual components of a record are accessed by the standard dot notation, e.g.

```
PERSON.NAME := "Waldo P. Wigglesworth   ";
```

Record structures appear in several guises. One variation on the plain vanilla record shown above is the constrained record—one in which the initial value of a constraint parameter is left unspecified until later declarations. This allows considerable variety among variables of one data type.

```
type GEOMETRIC_SHAPE (SIDES: integer) is
     record
     PERIMETER: SIDES * LENGTH_UNIT;
     end record;

TRIANGLE: GEOMETRIC_SHAPE (3);
SQUARE:   GEOMETRIC_SHAPE (4);
```

The constraint parameter, SIDES, appears after the type name. It is an integer variable, but the initial value depends on the declarations of TRIANGLE and SQUARE, which create GEOMETRIC SHAPES of three and four sides respectively. LENGTH UNIT must have been previously declared and set to some value. If the value had been 5 then TRIANGLE.PERIMETER would equal 15.

Arrays may be similarly constrained and both structures may be mutated in various other ways.

Attributes

Data types and structures in any language have certain attributes. An attribute of the integer data type could be the largest integer available on a particular computer. One attribute of an array structure might be the range of its index type (e.g. John..Ringo in the PLAYS array.)

In pre-Ada languages, after these attributes had been coded or hard-wired they were no longer directly available to the programmer. In Ada they are. Several attribute functions are available to query the various features of types and variables. Attributes are formed by writing an identifier followed by a single quote mark and the name of the attribute. RANGE is an important attribute. Writing PLAYS RANGE is the same as writing "John..Ringo." Thus, we could loop over the range of Beatles by writing

```
for SINGER in PLAYS'RANGE loop
    put (SINGER); put (": ");
    put (PLAYS(SINGER));
    new_line;  -- cr/lf function in TEXT_IO
    end loop;
```

which would produce the following output:

```
John: guitar
Paul: guitar
George: guitar
Ringo: drums
```

The same output would have been produced by writing

```
for SINGER in John..Ringo loop
```

or

```
for SINGER in BEATLE loop
```

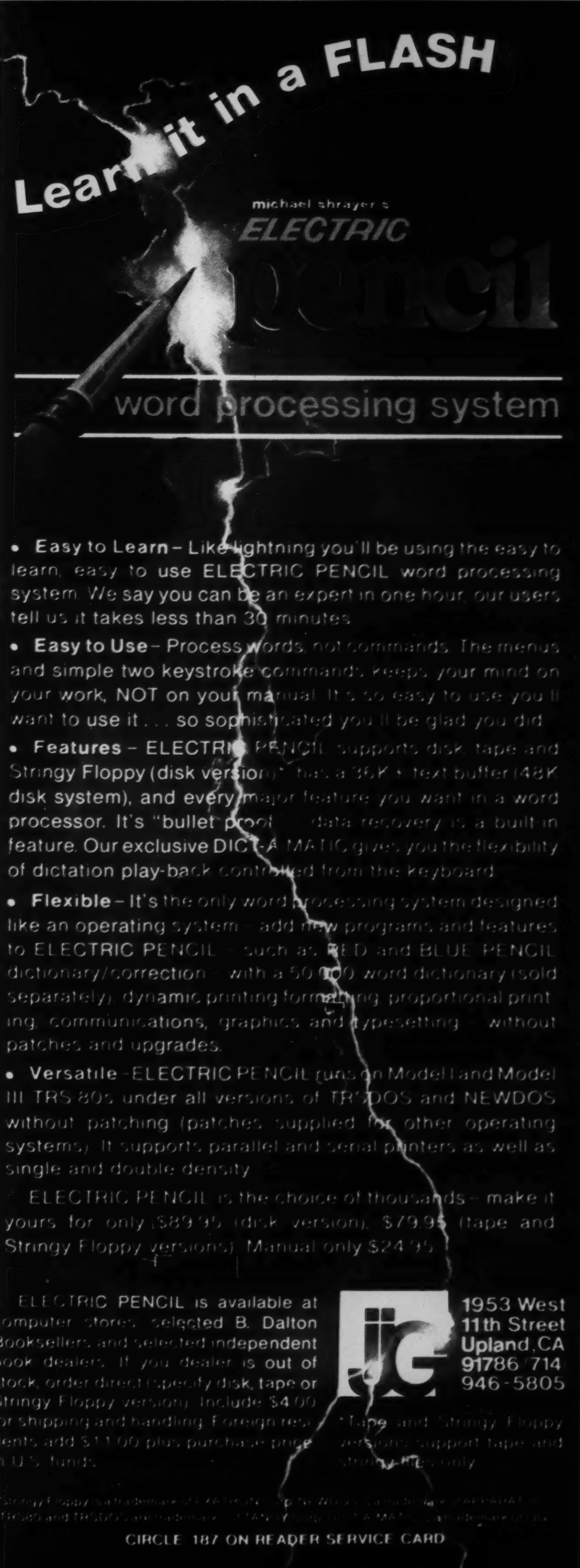
either of which would probably have been more elegant. In general, Ada gives you more ways to say the same thing than any other language.

There are 48 pre-defined attributes in Ada. Some of them behave differently depending on the object that they are appended to—FIRST, for example. When stuck onto an array, FIRST yields the lower bound of the index. PLAYS' FIRST equals John. When applied to the integer data type, FIRST gives the lowest available integer. On a 16-bit machine, INTEGER'FIRST would be - 32768.

Some attributes have parameters. Suppose we had declared a three-dimensional array called THREE_D. The attribute THREE_D'FIRST (3) would give the lower boundary of the third index. Enumeration types have several attributes of their own including SUCC and PRED, which yield the successor and predecessor of a particular enumeration value. For example, BEATLE'PRED(Ringo) is George. BEATLE' SUCC(BEATLE'PRED(George)) is George. As I said, it can get baroque.

Our tour of Ada is half over. So far, we have been looking at the small-scale features of the language including basic syntax and the description and manipulation of data. We have seen what Ada programs look like and learned how they exist in the context of a particular environment. Some of the basic data types of Ada made an appearance along with a few more sophisticated constructs such as enumeration types, derived types, aggregates, and attributes.

Now that the small details are taken care of, we can start thinking about the most unusual and innovative aspect of Ada: program organization. This will happen next month. The Countess and I will be looking forward to seeing you again. ☐



- **Easy to Learn** – Like lightning you'll be using the easy to learn, easy to use ELECTRIC PENCIL word processing system. We say you can be an expert in one hour, our users tell us it takes less than 30 minutes.
- **Easy to Use** – Process words, not commands. The menus and simple two keystroke commands keeps your mind on your work, NOT on your manual. It's so easy to use you'll want to use it . . . so sophisticated you'll be glad you did.
- **Features** – ELECTRIC PENCIL supports disk, tape and Stringy Floppy (disk version)*, has a 36K + text buffer (48K disk system), and every major feature you want in a word processor. It's "bullet proof" – data recovery is a built-in feature. Our exclusive DICT-A-MATIC gives you the flexibility of dictation play-back controlled from the keyboard.
- **Flexible** – It's the only word processing system designed like an operating system – add new programs and features to ELECTRIC PENCIL – such as RED and BLUE PENCIL dictionary/correction – with a 50,000 word dictionary (sold separately), dynamic printing formatting, proportional printing, communications, graphics and typesetting – without patches and upgrades.
- **Versatile** – ELECTRIC PENCIL runs on Model I and Model III TRS-80s under all versions of TRSDOS and NEWDOS without patching (patches supplied for other operating systems). It supports parallel and serial printers as well as single and double density.

ELECTRIC PENCIL is the choice of thousands – make it yours for only $89.95 (disk version), $79.95 (tape and Stringy Floppy versions). Manual only $24.95.

ELECTRIC PENCIL is available at computer stores, selected B. Dalton Booksellers and selected independent book dealers. If you dealer is out of stock, order direct (specify disk, tape or Stringy Floppy version). Include $4.00 for shipping and handling. Foreign residents add $11.00 plus purchase price in U.S. funds.

1953 West
11th Street
Upland, CA
91786 (714)
946-5805

*Tape and Stringy Floppy versions support tape and Stringy-files only.

Stringy Floppy is a trademark of EXATRON Corp. NEWDOS is a trademark of APPARAT [illegible] TRS80 and TRSDOS are trademarks of TANDY Corp. DICT-A-MATIC is a trademark of [illegible]

CIRCLE 187 ON READER SERVICE CARD

Stephen D. Page

The Pascal Directory in Depth, and Pascal Style in Brief

Programmers who write programs which require details of the contents of a disk are fortunate when working with UCSD Pascal. Because the operating system itself was written in Pascal, the disk directory is stored in a record format which is neatly handled as a complex data type.

Unfortunately, neither the Apple release (1.1) nor the Softech release (v. 2) provides details of the directory. This article describes the directory data structure and includes a catalog program which provides examples of various medium-complexity techniques and of what structured programming enthusiasts call "good style."

Listing 1, headed SYMDEF, defines a high-level data structure called "directory," which is an array of directory entries. Entry zero is the volume information. and entries 1-77 correspond to files on the disk. Notice the "stepwise refinement" of the data structure into smaller types, and the use of CONST declarations rather than meaningless integer values.

The data type "direntry," corresponding to an individual entry in the directory, is what Pascal programmers call a "variant record." It can contain two kinds of field lists, depending on the value of the field "filekind." Entry number 0 in the directory has filekind of "untypedfile," to indicate that it is the volume information for the disk: it contains the volume name and length (280 blocks on an Apple), and the date of the last boot using that disk.

The other entries in the directory contain the filename, the number of bytes in the last block of the file, and the date of the last change to the file. All directory entries contain the number of the first block in the file and of the first block after the end of the file.

If we declare a single variable "dir" of type "directory," and use UNITREAD to load the directory information from a disk, we can access any entry by using the format dir[n], where n is the entry number. References to dir[0] will indicate the volume information entry.

Stephen D. Page, 60 Meiers Road, Indooroopilly QLD 4068, Australia.

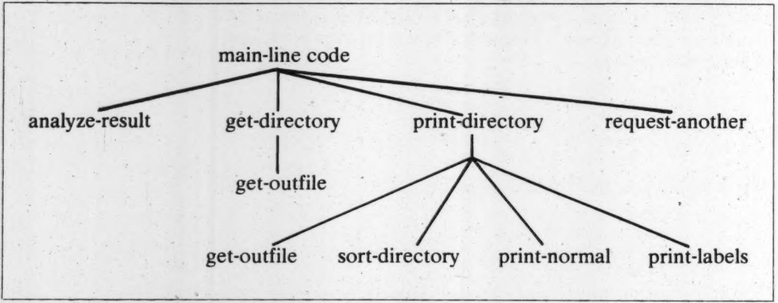


Figure 1. Structure of the program, CATALOG.

Fields within these directory entries may be accessed simply by adding a dot and the field name. Thus dir[3].filename will reference the name of the third file on the disk. Once this concept of record handling is grasped, it is a very simple matter to manipulate all or part of the directory structure.

The Catalog Utility

Listing 2, the program CATALOG, provides examples of manipulating the directory fields and an example of programming style. The program prompts for a disk unit number, then asks for the output destination (defaults to PRINTER:). Two formats are available: a normal printer format and a format for 102 x 36mm labels (easily adaptable for other sizes). The directory is sorted into alphabetical order before listing.

The program may look a bit frightening at first, but it is in clear modules, using a top-down design. To read a structured program it is easiest to start at the highest level, i.e. at the bottom of the listing, where the main-line code lives. This top level is characteristically brief, and contains procedure calls, which refine the process into smaller steps (some of which may be further procedure calls).

Notice that variables, procedures and functions which are only used within one block (i.e. another procedure or function) are declared at the start of that block. The program therefore has the hierarchical structure diagrammed in Figure 1.

There is not enough space to describe program operation in detail. The comments on the listing should be helpful. Notice the use of a file variable "outfile," which can be set with REWRITE to send output to any device, including the console, the printer, or a disk file. Notice also the absence of GOTO and EXIT statements, made possible by the BOOLEAN "finished."

The sort routine is a bit tricky: to avoid having to swap around chunks of memory, it shuffles an array which contains directory entry numbers. When the following routine prints out the file details, it examines the directory entries in the order given in the index array. For details of the insertion sort algorithm itself, see Schneider, Weingart and Perlman, *An Introduction to Programming and Problem Solving With Pascal* (New York: Wiley, 1978), p. 47-48.

Pascal is an extremely powerful language. Using Pascal, a programmer can take a top-down approach, refining the problem in stages. Manipulation of data structures, however complex, is very simple. Time spent developing Pascal skills can be very rewarding. ☐

FINAL CONFLICT

Will it be survival–or total annihilation?

You choose the battleground. You decide whether this will be a fast-paced tactical war or a brain-tingling strategic confrontation. You program your robot troops' dangerous course to the enemy base.

But the enemy is on the march, too—cold and deadly! Even the landscape threatens your army, as you pit your brain against your adversary's in The Final Conflict.

A war of nerves and skill, waged against the computer or a friend, from Hayden Software.

to order call:

1-800-631-0856

(in N.J. call 201-843-0550, ext. 382)

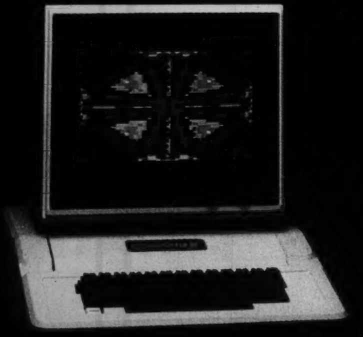
THE FINAL CONFLICT, #13609, Apple II disk, $34.95

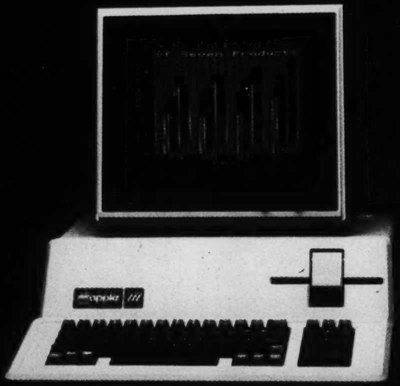
HAYDEN SOFTWARE

CIRCLE 183 ON READER SERVICE CARD

GOOD NEWS

Have you put aside buying a color monitor because it's too expensive?
But, have you looked at the new TAXAN RGBvision color monitor?
Would you be excited at a suggested retail price of $399.oo for the RGBvision I, and $599 for the RGBvision II?





DO WE HAVE GOOD NEWS FOR YOU!

For those low prices, you can have
☑ Full compatibility with Apple III and IBM PC without interface modules
☑ Compatible with Apple II through the TAXAN "RGB-II" card
☑ RGBvision I medium resolution - 380(H) lines
☑ RGBvision II high resolution - 510(H) lines
☑ Unlimited colors through linear amplifier video circuit and 16 colors for Apple III and IBM PC
☑ 12-inch, 90° deflection CRT display

Can you really afford to turn all that down without looking at the TAXAN RGBvision monitors? See your local dealer for a demonstration.

TAXAN 12" green phosphor monitor model KG12N features an 800 line resolution at center 2000 character display

TAXAN

TSK ELECTRONICS CORPORATION

1524 Highland Avenue
Duarte, California 91010
A subsidiary of Kaga Denshi

Apple II and III are trademarks of Apple Computer, Inc.
IBM PC is a trademark of International Business Machines Inc.

CIRCLE 304 ON READER SERVICE CARD

Listing 1.

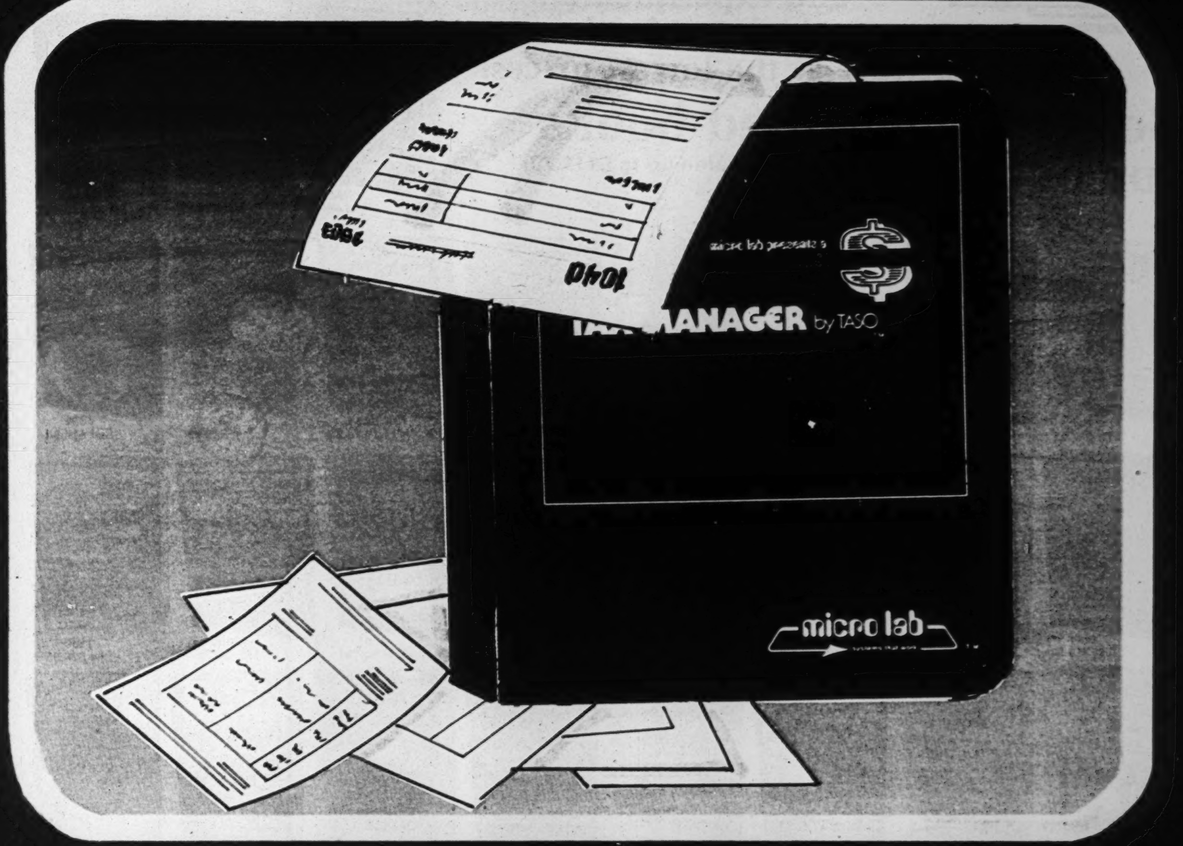
```
(****************************************************************************
 *                                                                          *
 *                                  SYMDEF                                  *
 *                                                                          *
 *                                                                          *
 *  Symbol definitions to retrieve information from Apple Pascal directory. *
 *                                                                          *
 *                        Stephen D. Page, June 1982                        *
 *                                                                          *
 *                                                                          *
 ****************************************************************************)

(* Note: Apple Pascal incorporates UCSD Pascal (trademark of The Regents of the
    University of California). The directory structure of the Apple system is
    based on UCSD specifications.*)

CONST
    (*Definitions of various limits and constants*)
    unitmax = 12;       (*maximum unit number*)
    dirmax = 77;        (*maximum files in directory*)
    dirlocation = 2;    (*directory starts on block 2 of disk*)
    vnamelength = 7;    (*volume name length*)
    fnamelength = 15;   (*file name length*)
    blocksize = 512;    (*blocksize in bytes*)

TYPE
    (*Definition of ranges and miscellaneous types found in directory entries*)
    unitrange = 0..unitmax;
    dirrange =  0..dirmax;       (*range of directory entries - 0=volume info*)
    byterange = 1..blocksize;    (*range of byte counts up to one block*)

    vname = STRING[vnamelength];
    fname = STRING[fnamelength];

    daterec = PACKED RECORD
        (*usual date format, with the following special features:
            a month of 0 indicates that the date is meaningless,
            and a year of 100 is apparently possible internally
            in the Pascal system.*)
                month: 0..12;
                day:   0..31;
                year:  0..100
              END;

    fkind = (untypedfile,xdskfile,codefile,textfile,infofile,datafile,
             graffile,fotofile,securedir);
        (*note that some of these file types do not normally occur in the
        directories of Apple Pascal v. 1.1, but they must all be declared
        here to ensure correct allocation of enumerated data type.*)

    (*Now for the big one: the directory entry. There are two types of entry:
    the volume information entry at position 0, and the normal file entries
    at positions 1..dirmax. A case statement determines which we are reading.*)

    direntry = RECORD
                firstblock: INTEGER;            (*first disk block*)
                lastblock:  INTEGER;            (*next disk block*)
                CASE filekind: fkind OF
                    securedir,untypedfile:      (*format of volume info entry*)
                        (volname: vname;        (*disk volume name*)
                         endvol: INTEGER;       (*volume length, i.e. number
                                                   of last block on disk*)
                         numentries: dirrange;  (*number of files in directory*)
                         accesstime: INTEGER;   (*not used in Apple Pascal*)
                         bootdate: daterec);    (*date set at last boot of disk*)
                    xdskfile,codefile,textfile,infofile,datafile,graffile,
                    fotofile:                   (*i.e. all the rest*)
                        (filename: fname;       (*guess what this is!*)
                         endbytes: byterange;   (*number of bytes in last block*)
                         accessdate: daterec);  (*date of last change to file*)
               END; (*CASE and RECORD direntry*)

    directory = ARRAY[dirrange] OF direntry;

(***************************** End of SYMDEF *******************************)
```

Listing 2.

```
PROGRAM catalog;

(****************************************************************************
 *                                                                          *
 *                                  CATALOG                                 *
 *                                                                          *
 *                                                                          *
 *              A program to list an Apple Pascal disk directory            *
 *                                                                          *
 *                        Stephen D. Page, June 1982                        *
 *                                                                          *
 *                                                                          *
 ****************************************************************************)

(*$C    Copyright (C) 1982  Stephen D. Page  -  Commercial rights reserved    *)

(* Load symbol definitions, contained in SYMDEF.TEXT, on the prefix disk *)
(*$I SYMDEF.TEXT*)

VAR
    unit_number: unitrange;
    result: INTEGER;
    dir: directory;
    index: ARRAY[1..dirmax] OF 1..dirmax;
    finished: BOOLEAN;
    outfile: TEXT;

PROCEDURE analyse_result;
(*Global routine to issue an error message for I/O result specified*)
BEGIN
    IF result IN [2,7..9,11,16,64]
        THEN CASE result OF
             2: WRITELN('? Bad device name');
             7: WRITELN('? Illegal file name');
             8: WRITELN('? No room on disk');
             9: WRITELN('? Specified volume is not on line');
            11: WRITELN('? Specified file already exists');
            16: WRITELN('? Disk is write-protected');
            64: WRITELN('? I/O device error (code 64)')
        END
        ELSE WRITELN('I/O error - code = ', result:2)
END;
```

```
PROCEDURE get_directory;
(*This routine prompts the user for a volume number and attempts to
read the directory block of the disk. Errors are trapped and a new
prompt is issued if necessary. An ETX character (returns value of 0)
or a volume number of 0 will set global boolean "finished".*)
CONST formaterror = 14;  (*I/O error code: invalid input format*)
VAR ok: BOOLEAN;
  PROCEDURE read_directory;
  (*called from get_directory main line, to read the block and
  either set boolean "ok" or issue I/O error message.*)
  BEGIN  (*read_directory code*)
      (*$I-*)  (*turn error checking off to enable our own error trapping*)
      UNITREAD(unit_number,dir,SIZEOF(dir),dirlocation);
             (*read the necessary number of bytes from the proper place*)
      result := IORESULT;  (*save the result, as it can only be read once*)
      IF result > 0
      (*$I+*)
          THEN analyse_result
          ELSE ok := TRUE
  END,  (*read_directory*)

BEGIN (*get_directory*)
    ok := FALSE;
    REPEAT
        WRITE('Directory of which volume number: ');
        (*$I-*)
        READLN(unit_number);
        result := IORESULT:
        (*$I+*)
        IF result = formaterror  (*returned for input format error*)
            THEN WRITELN('? Volume must be numeric (0 to exit)')
            ELSE IF result > 0  (*trap strange errors*)
                 THEN WRITELN('? Error reading volume number, code = ',result:2)
            ELSE IF unit_number = 0
                 THEN finished := TRUE (*Bomb on ETX character*)
                      ELSE
                        IF NOT (unit_number IN [4,5,9..12])
                          THEN WRITELN('? Unit is not a diskette device')
                          ELSE read_directory; (*this will set "ok" if it worked*)
    UNTIL finished OR ok  (*go back if an error occurred*)
END;

(*-------------------------------------------------------------*)

PROCEDURE print_directory;
(*Routine to produce the directory listing. It prompts for an output file,
sorts the directory information, and outputs a formatted listing for either
labels or normal styling.*)
VAR ch: CHAR; (*used in the mainline print-directory code*)
  FUNCTION get_outfile: BOOLEAN;
  (*Prompts for an output file, which may be null (i.e. a carriage return),
  in which case PRINTER: is supplied, or may be just a period, in which case
  CONSOLE: is supplied. Filenames not ending in '.' and not containing
  '.TEXT' in upper or lower case are supplied with an extension of .TEXT
  automatically. The file is opened, and if all went well TRUE is
  returned. If not, FALSE is returned and error messages are issued.*)
  VAR filespec: STRING;
  BEGIN
      get_outfile := FALSE;
      WRITE('Output file (default = PRINTER): ');
      READLN(filespec);
      IF filespec = '' THEN filespec := 'PRINTER:'
          ELSE IF filespec = '.' THEN filespec := 'CONSOLE:'
          ELSE IF (filespec[LENGTH(filespec)] <> '.') AND
                  (POS('.text',filespec) = POS('.TEXT',filespec))
                     THEN filespec := CONCAT(filespec,'.TEXT');
      (*$I-*)
      REWRITE(outfile, filespec);
      result := IORESULT;
      (*$I+*)
      IF result > 0 THEN analyse_result
          ELSE get_outfile := TRUE
  END;

  PROCEDURE sort_directory;
  (*Routine to sort the directory entries into alphabetical order. An insertion
  sort is used, and to save overheads the sort is made on an index of pointers
  to entries in the array "dir".*)
  VAR small: fname;
      location, temp, pointer, i: 1..dirmax;
  BEGIN
      (*First, initialize index to point to entries in the order they were read*)
      FOR pointer := 1 TO dir[0].numentries DO index[pointer] := pointer;
      (*Now sort the index, with starting point incremented by one each pass*)
      FOR pointer := 1 TO dir[0].numentries - 1 DO
        BEGIN
          small := dir[index[pointer]].filename;
          location := pointer;
          (*examine from starting point to end of index, looking for smallest*)
          FOR i := pointer + 1 TO dir[0].numentries DO
              (*compare the filename in the directory entry pointed to by
              the current index entry with the smallest found yet*)
              IF dir[index[i]].filename < small THEN
                BEGIN
                  small := dir[index[i]].filename;
                  location := i
                END;
          (*Now swap the smallest found in this pass with the starting item*)
          temp := index[pointer];
          index[pointer] := index[location];
          index[location] := temp
        END  (*and loop repeats for rest of directory*)
  END;

  PROCEDURE print_normal;
  (*Routine to print catalog in normal format. Information written to output file
  includes: date disk was last booted (not always significant, but the Pascal
  system doesn't bother to set month to 0 to indicate this!!), volume name,
  file names, file sizes and types, creation dates, and totals (number of free
  blocks is calculated to take into account blocks 0-5, which are reserved
  for use by Pascal system.*)
  CONST reservedblocks = 6; (*6 blocks (0-5) contain disk info and bootstrap*)
  VAR i,f, blocks: INTEGER;
  PROCEDURE writedate(date: daterec);
    (*This routine writes the date passed as an argument in the format
    dd-mmm-yy. Output goes to the file 'outfile'. *)
    BEGIN
        WRITE(outfile,date.day:2, '-');
        IF (date.month > 0) AND (date.month < 13)
            THEN CASE date.month OF
                     1: WRITE(outfile,'Jan');    7: WRITE(outfile,'Jul');
                     2: WRITE(outfile,'Feb');    8: WRITE(outfile,'Aug');
                     3: WRITE(outfile,'Mar');    9: WRITE(outfile,'Sep');
                     4: WRITE(outfile,'Apr');   10: WRITE(outfile,'Oct');
                     5: WRITE(outfile,'May');   11: WRITE(outfile,'Nov');
                     6: WRITE(outfile,'Jun');   12: WRITE(outfile,'Dec')
                 END
            ELSE WRITE(outfile,'???');
        WRITE(outfile,'-', (date.year MOD 100):2)
    END;
```

Now your Apple or IBM can give you complete income tax planning and record keeping!



And TAX·MANAGER™ from Micro Lab lets your Apple II or IBM prepare your return—and most schedules—the easiest, tax-saving way...and it's deductible!

- Saves hours of time and effort in tax preparation for individuals and unincorporated businesses.
- Reminds you to take advantage of all deductions.
- Easy to use, even if you've had little computer experience.
- It's "global"—make a change in one figure and all other related figures are automatically changed on the return.
- Automatically selects the tax method/computation that saves you the most.
- FREE one-year Extended Warranty replaces blown disks and gives you updated versions at no cost.

It's Tax Deductible!

AND AVAILABLE NOW...Floppy Disk Version

TAX·MANAGER T.M.

another fine product from

micro lab
systems that work

2310 Skokie Valley Road
Highland Park, Illinois 60035
(312) 433-7550

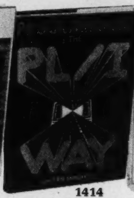
CIRCLE 214 ON READER SERVICE CARD

The Computer Book Club

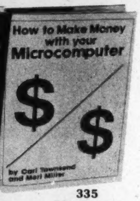
The ONLY Book Club dedicated exclusively to the special interests of microcomputer hobbyists and experimenters . . . the latest books and software at the lowest prices!

Select 6 fact-filled books for only $2.95 (total value up to $111.70)

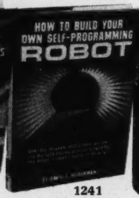
Towers' International Transistor Selector
1416
List $19.95

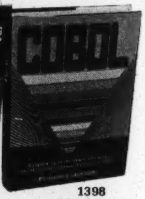


1414
List $15.95

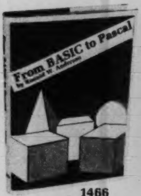

How to Make Money with your Microcomputer
$ / $
by Carl Townsend and Merl Miller
335
List $14.95

THE A TO Z BOOK OF COMPUTER GAMES
1062
List $12.95

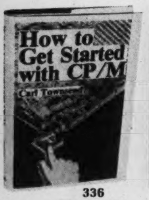

HOW TO BUILD YOUR OWN SELF-PROGRAMMING ROBOT
1241
List $12.95



1398
List $14.95


From BASIC to Pascal
1466
List $17.95

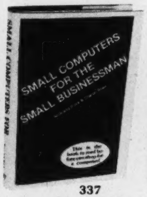
101 MICROPROCESSOR SOFTWARE & HARDWARE PROJECTS
1333
List $16.95


How to Get Started with CP/M
Carl Townsend
336
List $14.95

MICROPROCESSOR INTERFACING
1396
List $13.95

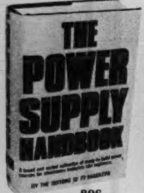
1205
List $16.95

PLAYING THE STOCK & BOND MARKETS WITH YOUR PERSONAL COMPUTER
1251
List $16.95


SMALL COMPUTERS FOR THE SMALL BUSINESSMAN
337
List $19.95

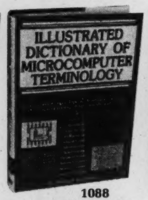
PROGRAMMING YOUR APPLE II COMPUTER
1394
List $15.95

1111
List $15.95

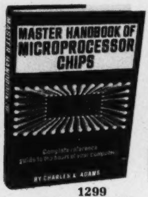

THE POWER SUPPLY HANDBOOK
806
List $16.95

33 Challenging Computer Games for TRS-80 /Apple /PET
1275
List $14.95

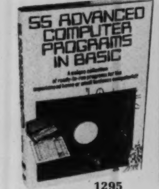
1001 THINGS TO DO WITH YOUR PERSONAL COMPUTER
1160
List $13.95


ILLUSTRATED DICTIONARY OF MICROCOMPUTER TERMINOLOGY
1088
List $13.95

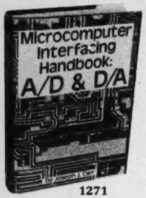
PROJECTS IN MACHINE INTELLIGENCE FOR YOUR HOME COMPUTER
1391
List $17.95


MASTER HANDBOOK OF MICROPROCESSOR CHIPS
BY CHARLES K. ADAMS
1299
List $16.95

The GIANT Handbook of Computer Projects
1169
List $16.95

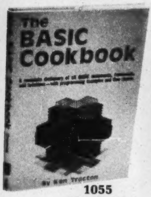

55 ADVANCED COMPUTER PROGRAMS IN BASIC
1295
List $16.95

COMPUTERS FOR EVERYBODY
338
List $14.95


Microcomputer Interfacing Handbook: A/D & D/A
1271
List $16.95

MC6809 COOKBOOK
1209
List $11.95

TEACHING YOUR COMPUTER TO TALK
1330
List $15.95


The BASIC Cookbook
1055
List $9.95

PACKET RADIO
1345
List $18.95

COMPUTER GRAPHICS with 29 ready-to-run programs
1276
List $15.95

7 very good reasons to try The Computer Book Club

Blue Ridge Summit, PA 17214

- **Reduced Member Prices.** Save up to 75% on books sure to increase your know-how
- **Satisfaction Guaranteed.** All books returnable within 10 days without obligation
- **Club News Bulletins.** All about current selections—mains, alternates, extras—plus bonus offers. Comes 13 times a year with dozens of up-to-the-minute titles you can pick from
- **"Automatic Order."** Do nothing, and the Main selection will be shipped automatically! But . . . if you want an Alternate—or no books at all—we'll follow the instructions you give on the reply form provided with every News Bulletin
- **Continuing Benefits.** Get a Dividend Certificate with every book purchased after fulfilling membership obligation, and qualify for discounts on many other volumes
- **Extra Bonuses.** Take advantage of added-value promotions, plus special discounts on software, games, and more
- **Exceptional Quality.** All books are first-rate publisher's editions, filled with useful, up-to-the-minute information

The Computer Book Club

Blue Ridge Summit, PA 17214

Please accept my membership in The Computer Book Club and send the 6 volumes circled below, billing me $2.95 plus shipping and handling charges. If not satisfied, I may return the books within ten days without obligation and have my membership cancelled. I agree to purchase 4 or more books at reduced Club prices (plus shipping/handling) during the next 12 months, and may resign any time thereafter.

335 336 337 338 806 1055 1062
1088 1111 1160 1169 1205 1209 1241 1251
1271 1275 1276 1295 1299 1330 1333
1345 1391 1394 1396 1398 1414 1416 1466

Name ______________________ Phone ______

Address ______________________

City ______________________

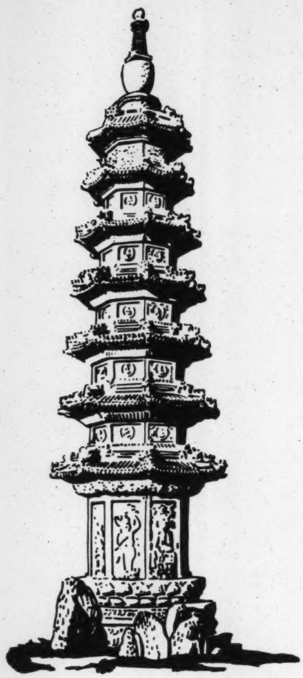
State ______________________ Zip ______

(Valid for new members only. Foreign and Canada add 20%. Orders outside U.S. or Canada must be prepaid with international money orders in U.S. dollars.)

This order subject to acceptance by The Computer Book Club CC-1182

CIRCLE 141 ON READER SERVICE CARD

```
BEGIN
    WRITE(outfile,dir[0].volname,':');
    IF dir[0].bootdate.month > 0 THEN (*month of 0 indicates meaningless date*)
        BEGIN
            WRITE(outfile,'      last booted on ');
            writedate(dir[0].bootdate)
        END;
    WRITELN(outfile); WRITELN(outfile);
    IF dir[0].numentries = 0 THEN WRITELN(outfile,'**** EMPTY DISK ****')
      ELSE BEGIN
          sort_directory;
          blocks := reservedblocks; (*allow for the disk info etc.*)
          FOR f := 1 TO dir[0].numentries DO WITH dir[index[f]] DO
            BEGIN
              WRITE(outfile,filename);
              FOR i := LENGTH(filename) TO fnamelength + 5
                DO WRITE(outfile,' ');
              CASE filekind OF
                xdskfile: WRITE(outfile,'Xdskfile');
                codefile: WRITE(outfile,'Codefile');
                textfile: WRITE(outfile,'Textfile');
                infofile: WRITE(outfile,'Infofile');
                datafile: WRITE(outfile,'Datafile');
                graffile: WRITE(outfile,'Graffile');
                fotofile: WRITE(outfile,'Fotofile');
                securedir:WRITE(outfile,'????????'); (*Should never occur*)
                untypedfile:WRITE(outfile,'Untyped!')
                END;
              blocks := blocks + lastblock - firstblock;
              WRITE(outfile,'    ',(lastblock-firstblock):3,'    ');
              IF accessdate.month > 0 THEN writedate(accessdate);
              WRITELN(outfile)
            END;
      WRITELN(outfile);
      WRITELN(outfile,'Total of ',dir[0].numentries:2,' files, ',
               blocks:4,' blocks    -  ',(dir[0].endvol - blocks):4,
                ' free')
  END
END;

PROCEDURE print_labels;
(*Routine to print volume name and file names only, in labels format as
defined by constants at head of routine.*)
CONST label_width = 3;  (*number of filenames across each line*)
      label_height= 8;  (*lines down*)
      label_space = 1;  (*lines between labels*)
      horiz_gap   = 1;  (*spaces between filenames, horizontally*)
VAR i,f,line_number: INTEGER;
BEGIN
    WRITELN(outfile,dir[0].volname,':');
    IF dir[0].numentries = 0
      THEN BEGIN
          WRITELN(outfile,'****** EMPTY DISK ******');
          FOR i := 2 TO label_height + label_space DO WRITELN(outfile)
                (*skip to top of next label form*)
        END
      ELSE BEGIN
        sort_directory;
        f := 1; line_number := 1;
        WHILE f <= dir[0].numentries DO
                     WITH dir[index[f]] DO
                       BEGIN
                         WRITE(outfile,filename);
                         IF f MOD label_width = 0
                             THEN
                       BEGIN
                         WRITELN(outfile);
                         line_number := line_number + 1;
                         IF line_number >= label_height
                          THEN BEGIN
                                FOR i := 1 TO label_space DO WRITELN(outfile);
                                line_number := 0
                               END;
                       END
                     ELSE FOR i := LENGTH(filename) TO fnamelength + horiz_gap-1
                          DO WRITE(outfile,' ');
                  f := f+1
                END;
          IF f MOD label_width <> 0 THEN WRITELN(outfile);
          IF line_number > 0
              THEN FOR i := line_number TO label_height + label_space - 1
                     DO WRITELN(outfile)
      END
  END;

(*------------------------------------------------------------*)

BEGIN  (*print_directory main body*)
    IF get_outfile THEN
        BEGIN
            REPEAT
                WRITE('Output in labels format (Y or N)? ');
                READ(ch); WRITELN;
            UNTIL ch IN ['Y','y','N','n'];  (*check lower case as well!*)
            IF ch IN ['Y','y'] THEN print_labels ELSE print_normal;
            CLOSE(outfile, LOCK)
        END
END;

PROCEDURE request_another;
(*Routine to ask user if another listing is required. Sets "finished" if
another is not required.*)
VAR ch: CHAR;
BEGIN
    WRITE('Another directory required (Y or N): ');
    READ(ch);WRITELN;
    IF NOT((ch='Y') OR (ch='y')) THEN finished := TRUE
END;

BEGIN   (*main-line code*)
    finished := FALSE;
    REPEAT
        get_directory;
        IF NOT finished THEN
              BEGIN
                print_directory;
                request_another
            END
    UNTIL finished
END.
```



The Towers Of Hanoi

A Lesson In Recursive Basic

Kimball M. Rudeen

The program described in this article is based on the recursive programming techniques described by Antonio Leal ("Recursive Programming in Basic," *Creative Computing*, Dec. 1981). When I first read the article, I was immediately reminded of a course in Pascal I took some years ago. One feature of this course was a very effective demonstration of recursion as both a programming and a problem-solving method. I decided to see if Dr. Leal's techniques could be applied to the task addressed in the demonstration.

The demonstration involved a problem known as the Towers of Hanoi. For the benefit of the uninitiated, this is as follows: You are given three rods and N disks, of different sizes. The disks can be stacked on any of the rods, forming towers.

Suppose the N disks are stacked in decreasing size on rod A, as shown in Figure 1 for N=4. The task is to move the N disks from rod A to rod C, in such a way that they wind up in the same order on rod C as on rod A. The moves made must meet the following requirements:

1. In each step, only one disk can be moved from one rod to another rod.
2. A disk may never be placed over a smaller disk.
3. Rod B may be used to store disks.

When the moves are made in the optimum manner, the number of moves necessary to move N disks is(2**N)-1; that is, three moves for two disks, seven moves for three disks, 15 moves for four disks, and so on. There is supposedly a legend that in a remote temple there are three rods and a set of 64 disks. The priests of this temple have been moving the disks from rod to rod since the world began. When the task is complete, the world will end. For 64 disks the number of moves is 18,446,744,073,709,551,615. If one move is made per second, this will take about 58 trillion years.

In my Pascal course, we were shown how recursion could be used to solve a problem by redefining it as a set of subproblems which were either trivial or simpler versions of the original problem. For the Towers of Hanoi, the main problem is, "Move N disks from rod A to rod C." This can be broken into three subproblems:

1. Move N-1 disks from rod A to rod B.
2. Move one disk from rod A to rod C.
3. Move N-1 disks from rod B to rod C.

The application of recursion is immediately evident. Each of the more difficult subproblems can be broken down into three still simpler sub-subproblems, and so on, until N-1 is equal to 1 and the final set of subproblems is a simple set of moves of single disks. It is only necessary to write a routine that will break any given disk problem down into the three subproblems and call itself to solve the more difficult ones.

Listing 1 is a Basic program written to use this approach. The recursive subroutine first increments the level count used to maintain the local variables, and sets the disk count for the current level. The next three sections mirror the subproblem breakdown described above.

Section 1 redefines the current problem into the first subproblem for the level. If the subproblem is now simple (number of disks for this level is one), it is solved. Otherwise Section 1 makes a recursive subroutine call with the new subproblem. When a return from this call occurs, the entire solution to the first subproblem will have been printed out.

Figure 1.

```
       *                  *                  *
       *                  *                  *
       *                  *                  *
   *********              *                  *
  ***********             *                  *
 *************            *                  *
***************           *                  *

       A                  B                  C
```

Kimball M. Rudeen, 335 Lowell St., Lexington, MA 02173.

California Accessory Warehouse

We will beat any advertised price!

- Free freight on all items listed
- Most orders shipped same day
- Open 7 days a week
- MasterCard, Visa, Personal Check, Money Order or C.O.D.
- Call for programs not listed

DISCOUNT COMPUTER ACCESSORIES

ATARI®

Atari is a Registered Trademark of Atari Inc

NAME	*	PRICE
ACTION QUEST	DK	$25
ALI BABA & 40 THIEVES	DK	28
APPLE PANIC	DK	25
ATARI BASIC BOOK	BK	9
ATARI BASIC REFERENCE	BK	10
CANYON CLIMBER	DK	25
CENTIPEDE BY ATARI	CT	34

NAME	*	PRICE
CLOWNS AND BALLOONS	CS	$25
CROSSFIRE	DK	25
CRUSH, CRUMBLE, CHOMP	DK	25
CRYPTS OF TERROR	DK	30
CURSE OF RA	DK	17
CYCLOD	DK	25
DATA PERFECT	DK	85
DEADLINE	DK	42
DELUXE INVADERS	CT	34
FILE MANAGER 800	DK	85
GHOST ENCOUNTERS	DK	25

NAME	*	PRICE
GORF	CT	$42
HOME FILING MGMT	DK	42
INVIT. TO PROG. 1	CS	21
INVIT. TO PROG. 2	CS	25
INVIT. TO PROG. 3	CS	25
K-RAZY ANTIKS	CT	42
K-RAZY SHOOTOUT	CT	42
K-STAR PATROL	CT	42
LETTER PERFECT	DK	127
MARCO ASSEM & TEXT	DK	76
MASTER TYPE	DK	34
MICROSOFT	DK	76
NAUTILUS	DK	25
PAC MAN BY ATARI	CT	34
PACIFIC COAST HWY	CS	25
PREPPIE	DK	25
PROTECTOR	CS	25
RASTER BLASTER	DK	25

NAME	*	PRICE
REAR GUARD	DK	$21
SAM	DK	50
SHAMUS	DK	25
SOFTPORN ADVENTURE	DK	25
SPACE EGGS	DK	25
TECH USER NOTES	BK	25
TELECOM	DK	72
TEMPLE OF APSHAI	DK	34
THE UP REACH APSHAI	CS	17
THRESHOLD	DK	34
TRACK ATTACK	DK	25
ULTIMA I	DK	34
ULTIMA II	DK	44
VISICALC	DK	185
WIZARD AND PRINCESS	DK	26
WIZARD OF WOR	CT	42
ZORK 1	DK	32
ZORK 2	DK	32

apple®

Apple is a Registered Trademark of Apple Computer, Inc

NAME	*	PRICE
ALPHA PLOT	DK	$34
APPLE GRAPH & ARCADE	BK	17
APPLE MECHANIC	DK	25
APPLE PANIC	DK	25
ASSEMBLY LANGUAGE	BK	17
ATLANTIS	DK	34
BAG OF TRICKS	DK	34
BANDITS	DK	30
BENEATH APPLE DOS	BK	17
BOOK OF SOFTWARE 82	BK	17
CANNONBALL BLITZ	DK	30
CASTLE WOLFENSTEIN	DK	25
CHOPLIFTER	DK	30
CRANSTON MANOR	DK	30
CRUSH, CRUMBLE, CHOMP	DK	25
CURSE OF RA	DK	17
CYCLOD	DK	25
D.B. MASTER	DK	183
DATA CAPTURE 4.0	DK	55
DAVIDS MIDNIGHT MAGIC	DK	30
DB MASTER UTIL PAK 1	DK	84
DB MASTER UTIL PAK 2	DK	84
DBASE II	DK	595
DEADLINE	DK	35

NAME	*	PRICE
DOS BOSS	DK	$20
ELECTRIC DUET	DK	25
ENHANCER II	AC	127
FLIGHT SIMULATOR	DK	28
FROGGER	DK	28
GAME PADDLES	AC	34
GRAFORTH II	DK	64
GRAPHIC SYSTEM	DK	59
GRAPHICS MAGICIAN	DK	51
GROGAN	DK	34
HOME ACCOUNTANT	DK	64
HORIZON V	DK	30
JOYSTICK	AC	48
KABUL SPY	DK	30
KIDS AND THE APPLE	BK	17
KNIGHTS OF DIAMONDS	DK	30
MAGIC WINDOW	DK	80
MAGIC WORDS	DK	59
MAILMERGE	DK	106
MARAUDER	DK	30
MASTER TYPE	DK	34
MICROSOFT SOFT CARD	AC	659
MICROWAVE	DK	30
OLYMPIC DECATHLON	DK	25

NAME	*	PRICE
PFS: GRAPH	DK	$106
PFS: PER FILING SYS	DK	106
PFS: REPORT	DK	81
PIE WRITER STD	DK	127
PINBALL	DK	25
POWER OF VISICALC	BK	8
POWER OF VISICALC 2	BK	8
RAM CARD	AC	166
RASTER BLASTER	DK	23
RENDEZVOUS	DK	34
ROBOT WAR	DK	34
SAM	DK	110
SARGON II	DK	30
SCREENWRITER 2	DK	110
SENSIBLE SPELLER	DK	106
SERPENTINE	DK	30
SNACK ATTACK	DK	25
SOFT VIDEO SWITCH	AC	30
SOFTCARD	AC	336
SPELLSTAR	DK	170
STAR BLAZER	DK	27
SUPER TEXT 2	DK	128
SUPERSOFT I	DK	150
SWASHBUCKLER	DK	30

NAME	*	PRICE
SYSTEM SAVER	AC	$76
TARGET PLANNER CALC	DK	43
TEMPLE OF APSHAI	DK	32
THRESHOLD	DK	33
TWERPS	DK	25
TYPING TUTOR II	DK	21
ULTIMA	DK	32
ULYSSES & GOLDEN FLE	DK	30
UTILITY CITY	DK	25
VIDEOTERM	AC	293
VISICAL 3.3	DK	198
VISICALC 80 COL PRE	DK	42
VISIFILE	DK	168
VISITERM	DK	85
VISITREND/VISIPLOT	DK	255
WIZARD AND PRINCESS	DK	28
WIZARDRY	DK	42
WORDSTAR	DK	268
ZOOM GRAFIX	DK	34
ZORK	DK	34
ZORK 1	DK	34
ZORK 2	DK	32

Radio Shack® TRS-80®

TRS 80 is a Registered Trademark of the Radio Shack Division of Tandy Corporation

NAME	*	PRICE
ATTACK FORCE	DK	$17
B-1 NUCLEAR BOMBER	CS	14
COSMIC FIGHTER	DK	17
CRUSH, CRUMBLE, CHOMP	DK	25
CURSE OF RA	DK	17
DEFENCE COMMAND	DK	17
ELIMINATOR	DK	21
EMPIRE OF OVERMIND	DK	30
FLIGHT SIMULATOR	CS	28
GALAXY INVASION	DK	17
LUNER LANDER	DK	18
METEOR MISSION II	DK	17
MIDWAY CAMPAIGN	CS	14
OLYMPIC DECATHLON	DK	25

NAME	*	PRICE
PENETRATOR	DK	$21
ROBOT ATTACK	DK	17
SARGON II	DK	30
SCARFMAN	DK	17
STARFLEET ORION	DK	21
STARFLIGHT-STAR TREK	DK	17
STELLAR ATTACK	DK	17
STELLAR ESCORT	CS	14

NAME	*	PRICE
SUPER NOVA	DK	$17
TEMPLE OF APSHAI	DK	34
TYPING TUTOR	CS	17

*** TYPE KEY:**
AC = ACCESSORY
BK = BOOK
CS = CASSETTE
CT = CARTRIDGE
DK = DISK

Order toll-free 1-800-241-2222

Inside California and
Customer Service call 1-213-781-3828

No sales tax!
(except California
residents add 6.5%)

VISA
MasterCard

To order by mail send Check or Money Order or call for faster service and use your MasterCard or Visa. When ordering, state make and model of machine and choice of disc, cartridge or cassette

California Accessory Warehouse
6726 Van Nuys Blvd., Van Nuys
CA 91405

CIRCLE 129 ON READER SERVICE CARD

Towers of Hanoi, continued...

Section 2 simply solves the second subproblem, which is nothing more than a one disk move. Note that the move is defined on the previous level.

Section 3 defines the third subproblem and solves it or calls the subroutine with the subproblem as in Section 1. When a return from this call occurs, the entire solution to the third subproblem and therefore the entire solution to the problem at this level will have been printed out.

After Section 3, the subroutine will decrement the level count and return to the previous level.

Figure 2 is a listing of the solution to the three-disk case. Each move is illustrated with a diagram showing its effect.

Note that while the subroutine has one return and is entered on one line, it calls itself in two places. At some stages of the solution a return from a lower level will be after Section 1, and at other stages the return will be at the end of Section 3. After the final move of a solution is output, the subroutine will be at the very lowest level of recursion, and all of the unreturned subroutine calls will have been made in Section 3. As a result, the final operation of the program will be a cycle of level decrements and returns until the top level is reached and the routine returns to the main program.

Figure 2.

```
                        A             B             C

                        *             *             *
                        *             *             *
INITIAL                ***            *             *
                      *****           *             *
                     *******          *             *

                        *             *             *
                        *             *             *
MOVE 1 :A TO C          *             *             *
                      *****           *             *
                     *******          *            ***

                        *             *             *
                        *             *             *
MOVE 2 :A TO B          *             *             *
                        *             *             *
                     *******        *****          ***

                        *             *             *
                        *             *             *
MOVE 3 :C TO B          *             *             *
                        *            ***            *
                     *******        *****           *

                        *             *             *
                        *             *             *
MOVE 4 :A TO C          *             *             *
                        *            ***            *
                        *           *****        *******

                        *             *             *
                        *             *             *
MOVE 5 :B TO A          *             *             *
                        *             *             *
                       ***          *****        *******

                        *             *             *
                        *             *             *
MOVE 6 :B TO C          *             *             *
                        *             *           *****
                       ***            *          *******

                        *             *             *
                        *             *             *
MOVE 7 :A TO C          *             *            ***
                        *             *           *****
                        *             *          *******
```

Listing 1.

```
10 REM       TOWERS OF HANOI
20 REM    BY KIMBALL M. RUDEEN
30 CLEAR 1000
40 DEFINT A-Z
50 INPUT "NUMBER OF DISKS";N
60 DIM ND(N),X$(N),Y$(N),Z$(N)
70 X$(1)="A"
80 Y$(1)="C"
90 Z$(1)="B"
100 LV=1
110 ND(1)=N
120 NM=0
130 GOSUB 1000
140 LPRINT "PROBLEM COMPLETE"
150 END
1000 REM RECURSIVE SUBROUTINE
1010     LV=LV+1
1020     ND(LV)=ND(LV-1)-1
1030 REM SECTION 1
1040        X$(LV)=X$(LV-1)
1050        Y$(LV)=Z$(LV-1)
1060        Z$(LV)=Y$(LV-1)
1070        IF ND(LV)=1 THEN NM=NM+1:LPRINT MOVE";NM;":";X$(LV);
            " TO ";Y$(LV)
            ELSE GOSUB 1000
1080 REM SECTION 2
1090        NM=NM+1:LPRINT "MOVE";NM;":";X$(LV-1);" TO ";Y$(LV-1)
1100 REM SECTION 3
1110        X$(LV)=Z$(LV-1)
1120        Y$(LV)=Y$(LV-1)
1130        Z$(LV)=X$(LV-1)
1140        IF ND(LV)=1 THEN NM=NM+1:LPRINT "MOVE";NM;":";X$(LV);
            " TO ";Y$(LV)
            ELSE GOSUB 1000
1150     LV=LV-1
1160     RETURN
```

This program is a very good example of the power of recursive programming, even in a language not specifically designed for it. The structure of the subroutine is extremely simple, even in Basic. In Pascal, which requires no bookkeeping on local variables, the program for this problem seemed to be no more than a subroutine that did nothing but call itself.

One final point of interest is the size of the problem that the program can, in theory, solve. The amount of memory required for the variable arrays depends on the number of disks, not on the number of moves in the final solution. Even the maximum "stack" of recursive subroutine calls that can exist at one time is equal to the number of disks minus one. I find it a little mind-boggling that if handed the 64-disk problem, the program will almost immediately begin printing out the solution, and that given enough time (and paper) it will finish. ☐

Lovers
OR
STRANGERS

Were you made for each other? Are the two of you destined for romance? Spend an evening with LOVERS OR STRANGERS, and find out. LOVERS OR STRANGERS can tell how compatible you are in love, sex, money, work, play and more. It's fun...it's serious...it's romantic...it's thought-provoking...it will keep you up nights.

LOVERS OR STRANGERS is available at your local dealer or direct from
Alpine Software, 2120-E Academy Circle, Colorado Springs, CO 80909 (303) 591-9874

Only $ 29.95. Add $.100 for shipping/handling. VISA, Mastercard, checks, COD accepted.
Colorado residents add 3% sales tax. Requires Apple II Plus, 48K, DOS 3.3, and a willing partner.

Apple II Plus is a registered trademark of Apple Computers, Inc.

CIRCLE 106 ON READER SERVICE CARD

For the ATARI*
A New EPYX
Graphic-Adventure
from Automated Simulations

CRYPT OF THE UNDEAD

SUDDENLY **you awaken in a coffin surrounded by a vast graveyard. YOU MUST GET OUT BEFORE DAWN!**

HOW? There's no easy way, the walls are too high—the gates are locked. Vampires, Zombies, and Werewolves constantly attack as you frantically search musty crypts, catacombs, and dead tombs for treasures and clues. ***ONLY TWELVE HOURS TO ESCAPE OR REMAIN FOREVER!***

CRYPT OF THE UNDEAD, designed by Marc Benioff, Offers . . .

- *Both Puzzle-Solving & Role-Playing Intrigue!*
- *Superb Graphics, Sound & Color Animation!*
- *Hours of Challenging Terror!*

Requires . . .

- *ATARI 400/800 & One Disk Drive*
- *One Player & Joystick Controller*

Comes with . . .

- *Game Program & Complete Instructions*
- *EPYX 30/FOREVER WARRANTY*

Now Available At Your Favorite Dealer . . . $29.95
For the name of your nearest EPYX dealer write:
"CRYPT OF THE UNDEAD"
EPYX/Automated Simulations, Inc.
P.O. Box 4247, Mountain View, CA 94040

EPYX
COMPUTER GAMES
THINKERS PLAY

EPYX Temple of Apshai was the very first computer game ever to win the Hobby Industry award for excellence. EPYX pledges you that same excellence in every game you purchase from us . . . the VERY BEST in entertainment!

EPYX 30/FOREVER WARRANTY

***Our 30-day Unconditional Guarantee: If your EPYX Game has any defect whatsoever within 30 days of purchase, return it to us or your dealer and we will replace it free.**

***Our Forever Warranty: If anything happens to your disk at any time after 30 days, for any reason, just send it back with $5.00 for shipping, and we will send you a replacement.**

**ATARI 400/800 is a trademark of ATARI, INC.*

CIRCLE 117 ON READER SERVICE CARD

How to Find It

Programming Data Structures In Basic

Part 3

Edward Mitchell

Part two of this four-part series showed how the memory of a computer can be organized into data structures such as lists, stacks, queues and trees. This month's article shows how to create and use the structures in Basic programs, and presents the source listing of the genealogical database designed in Part Two.

All program examples, except where otherwise noted, are written in Advanced Basic on the IBM Personal Computer. All should run on other computers that use Microsoft Basic, such as the Radio Shack Model II or the Osborne 1.

Allocating Memory

Each data structure requires a changing or "dynamic" area of memory. The stack, for example, needs an ever increasing amount of memory as new numbers are pushed. When the numbers are popped, the memory becomes free.

List elements can appear anywhere in memory because each element is linked to the next by a pointer. It isn't necessary to place elements one right after the other. Furthermore, when elements are deleted, the memory space that was occupied must be made free and available for future use.

Unfortunately, a language like Basic doesn't provide for dynamic allocation of memory. Many Basics allow an array to be dimensioned only once during program execution—DIM A(100) cannot be changed later to DIM A(150), at least not without destroying the older data in array A(). This means that the Basic program must simulate dynamic memory allocation. The section on lists shows one approach to allocating memory dynamically in Basic programs.

Stacks

A simple way to create a stack is to use an array and an index or pointer variable. Let DIM S(100) be space for a stack having up to 100 elements, and let P be a pointer to the top of the stack. Initially set P to 1. To add or push data on to the stack, the program executes,

S(P)=D
P=P + 1

For example, a stack containing five numbers,

P=6
S(5) =21
S(4) =13
S(3) =8
S(2) =5
S(1) =3

A pop is the reverse of the push,

P=P - 1
D=S(P)

Appropriate checks should insure that P does not exceed the dimensions of S(100).

Queues

A queue can be implemented by using a variation of the stack. With a queue, elements are always removed from the head and added at the tail. Instead of a single stack pointer, the queue needs two pointers: H for head and T for tail.

Let DIM Q(100) be a queue having 100 elements. At first, the queue is empty, so we have,

H=1 and T=0

To add a value D to the tail of the queue, set

T=T + 1
Q(T)=D

Adding to the queue is the same as a push onto the stack. The major difference occurs when an element is removed from the head:

D=Q(H)
H=H + 1

Adding and deleting elements to the queue is illustrated by Figure 1. Initially there are five elements in the queue. At (b) a new element is added to the tail and at (c) one element is removed from the head. Two problems must be dealt with in this arrangement.

First, what happens when either H or T exceeds 100? One solution is to reset either value to 1 so that the queue "wraps around" back to the first element of Q(). Element 1 then follows element 100 in a circular fashion, as illustrated in Figure 2.

Edward Mitchell, 813 West Stevens Ave., #1, Santa Ana, CA 92707.

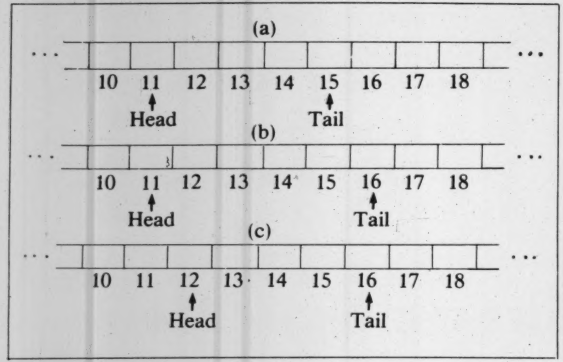


Figure 1. A queue data structure represented in an array.(a) shows a queue with five items. A new element is added to the tail in (b), while another is removed from the head in (c).

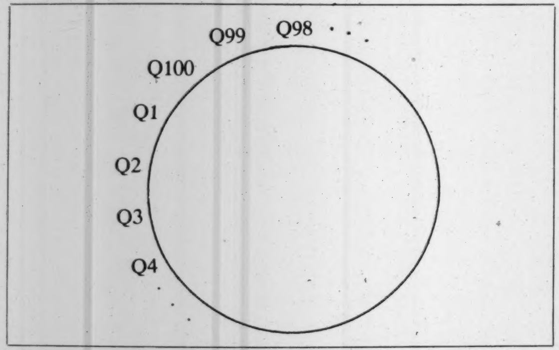


Figure 2. A circular queue is programmed in a fixed size array. If we define DIM Q(100) as an array of 100 numbers, then the queue can be made to grow by having it "wrap around" when reaching Q(100). In effect, Q(100) is followed by Q(1). Listing 2 uses this technique to implement a queue structure.

Second, if the queue has more than 200 entries, the tail will overtake the head and data will be destroyed. To detect when the queue is full, a variable N is used that counts the number of elements in the queue. A complete set of subroutines to add and delete queue entries is shown in Listing 1.

Before adding or deleting elements, the program should GOSUB 1000 to initialize the queue variables. The variable MAX should be set to the maximum size of the queue (for 100 entries MAX=100) and a DIM Q(MAX) should be placed near the start of the program.

The queue can be made to hold more than just numbers by changing the array Q() to some other type. By changing DIM Q(100) to Q$(100), and D to D$, the queue may contain a list of names.

Several arrays can hold additional data in parallel. For example, DIM Q1(100), Q2(100), and Q3(100), and let D1, D2, and D3 be additional data variables. To add the name D$ and the three numeric values, perform

```
T=T + 1
Q$(T) =D$
Q1(T) =D1
Q2(T) =D2
Q3(T) =D3
```

To remove data from the head of the queue, execute the statements,

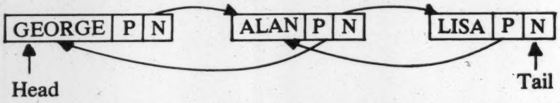
```
D$=Q(H)
D1=Q1(H)
D2=Q2(H)
D3=Q3(H)
```

See the articles by Gorney for more information about queues.

Lists

As mentioned earlier, list elements do not have to appear one after the other, but may appear in any order. That means a simple array and a couple of pointers will not work. If a list element in the middle of the array is deleted, the program must keep track of the freed space, otherwise unusable holes develop.

For a list of names, three arrays are created. DIM N$(100) holds the name part of each field. DIM P(100) is the pointer to the previous entry in the list, and DIM N(100) is a pointer to the next entry in the list. Let H be a pointer to the head of the list, and let T point to the tail of the list. Like the queue, these two variables point to the first and last elements of the list, respectively. Graphically, a short list of names appears as



The "previous" field for GEORGE (denoted by P) and the "next" field for LISA (denoted by N) don't point anywhere because they are at the head and tail of the list, respectively.

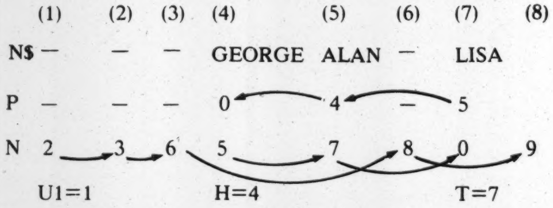
When represented as arrays, the list might appear as:

```
N$(3)=LISA        N(3)=1    P(3)=7
N$(1)=SAM         N(1)=0    P(1)=3
N$(7)=GEORGE      N(7)=3    P(7)=0
```

Note that the elements are not consecutive, and that they do not have to begin at the first element in the arrays. P(4) and N(7) are both 0 because they don't point anywhere. By tracing the P() and N() pointers, verify for yourself that the three names are correctly linked together.

In the N$(), P() and N() arrays, each of the elements is either used or unused. The used entries are all linked together by the P() and N() pointers. To keep track of the free entries, the program may link the unused elements together, again using the P() or N() arrays.

For example, let U1 be the index of the first unused entry and let U2 be the tail of the unused list. The list consisting of GEORGE, ALAN, and LISA might be represented as shown below,



	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
N$	—	—	—	GEORGE	ALAN	—	LISA	
P	—	—	—	0	4	—	5	
N	2	3	6	5	7	8	0	9
	U1=1			H=4			T=7	

In effect, the arrays are holding two lists simultaneously: the list of names and the list of unused entries.

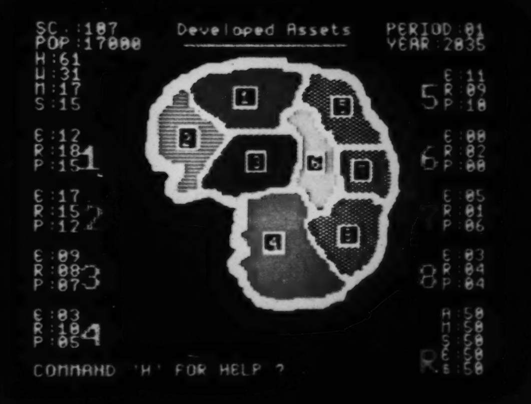
To remove ALAN from the list, the entry at location 5 must be unhooked from the name list and then added to the tail of the unused entries list. The deletion is performed by setting N(4) to point to 7, so that it by-passes location 5. Similarly, P(7) is set to point to location 4. The newly freed entry is then attached to the tail of the unused list, by executing,

```
N(U2)=5
N(5)=0
U2=5
```

Arcade Gamers...

Expand your horizons.

Our fabulous New Wave Strategy line by Terry Eagan represents a new concept in strategy gaming.



```
SC  :187        Developed Assets    PERIOD:01
POP :17000                          YEAR  :2035
H :61
W :31
M :17                                   E :11
S :15                                 5 R :09
                                        P :10
E :12
R :181                                  E :00
P :151                                6 R :02
                                        P :00
E :17
R :152                                  E :05
P :122                                7 R :01
                                        P :06
E :09
R :083                                  E :03
P :073                                8 R :04
                                        P :04
E :03
R :104                                  H :50
P :05                                   M :50
                                        S :50
                                        E :50
COMMAND 'H' FOR HELP ?                R 6 :50
```

ZENDAR is an involved economic-defense simulation. Simple to play yet intrinsically complex, its underlying model may require years of strategy optimization. ZENDAR may take some slightly longer than one hour to play, but potential empire builders will find it positively captivating. (**Pure Strategy**)

FRONTLINE is a battle of wits and strategy. You dispatch troops to defend your front line and break through an enemy sector. This game requires quick offensive and defensive tactical maneuvering. (**Arcade-Strategy**)

ROADBLOCK is a chase game with the realism you've come to expect from SubLOGIC. Dispatch your police cars to prevent bank robbers from escaping in their Porsche 924. (**Arcade-Strategy**)

Learn in 5 minutes, play in 1 hour.

48K Apple II disk, $29.95.

See your dealer...

or for direct orders, add $1.50 and specify UPS or first class mail. Illinois residents add 5% sales tax. Visa and MasterCard accepted.

"Apple" is the registered trademark of Apple Computer Inc.

subLOGIC

Communications Corp.
713 Edgebrook Drive
Champaign, IL 61820
(217) 359-8482
Telex: 206995

CIRCLE 295 ON READER SERVICE CARD

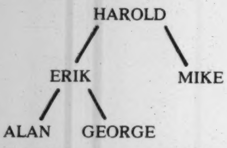
Listing 2 presents sample routines to implement a list structure. To insert names, select option A (for add). When it asks for the location, enter 0 and then the name to add. Thereafter, to add names, enter the location at which the new name should follow.

For example, after entering the first name, the Head and Tail are both set to 1. The second name might then be attached after 1 by entering a 1. Option D displays the list structure, showing both the list of free space and each of the list elements, including the next and previous pointers. The subroutines in Listing 1 can be easily applied to a self-organizing list, like the one described in Parts One and Two.

Trees

Trees are programmed like lists—pointers to the left and right. Subtrees of each node are kept in a set of arrays. Like the list, the names are stored in array N$(). Pointers to the left and right subtrees beneath any node are kept in L() and R(), respectively.

A small tree having the structure,



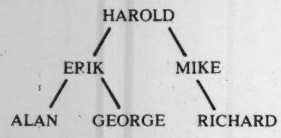
might be represented in the arrays N$(), L() and R() as

N$(1)=HAROLD	L(1)=2	R(1)=5
N$(2)=ERIK	L(2)=0	R(2)=4
N$(3)=ALAN	L(3)=0	R(3)=0
N$(4)=GEORGE	L(4)=0	R(4)=0
N$(5)=MIKE	L(5)=0	R(5)=0

The zero in the L() and R() values shows that there is no subtree beneath those nodes. You should verify that the values shown above do, indeed, represent the tree structure.

New names are added to the tree by linking in a new branch and leaf at the appropriate node. First, a binary search is used to see if the name to be added already exists. If the name is already in the tree, it cannot be added. When the search completes without having found the name, it has stopped at the point where the name should appear.

For example to add RICHARD to the tree shown above, the algorithm first searches the tree. Seeing that RICHARD is not found to the right of MIKE, the search terminates. Therefore, the name should be placed along a new branch descending to the right of MIKE, giving the tree,



The arrays are updated to show the addition of the new name, giving,

N$(1)=	HAROLD	L(1)=2	R(1)=5
N$(2)=	ERIK	L(2)=0	R(2)=4
N$(3)=	ALAN	L(3)=0	R(3)=0
N$(4)=	GEORGE	L(4)=0	R(4)=0
N$(5)=	MIKE	L(5)=0	R(5)=6
N$(6)=	RICHARD	L(6)=0	R(6)=0

A Basic program, demonstrating searching and adding to a tree structure is shown in Listing 3. Deletion of individual tree entries is not described in this article because there are problems that make deletion a difficult task.

Traversing a Tree

A tree is "traversed" by climbing from node to node or node to leaf within the tree. By changing the direction of the climb, the data in the tree can be read in either ascending or descending order.

To produce an ascending order traversal (also known as "inorder" and "symmetric" order), the traversal algorithm descends as far as it can down the left side of tree. After visiting the leaf on the far left, it moves up to the node immediately above and visits nodes along the right branch. Ascending order traversal algorithms are shown in Algorithms 1 and 2.

```
Algorithm 1
  In Order Tree Traversal
  Step Action
  1) Set S = Root
  2) Traverse Tree (S) (see Algorithm 2)
  3) Stop

Algorithm 2
  Traverse Tree
  Enter with S be the tree to traverse
  Step Action
  1) If Left Branch (S) exists then
       PUSH S          Save S on stack
       S = Left Branch (S)
       Traverse Tree (S)
       S = POP         Get old value of S back
  2) Display the name at node S
  3) If Right Branch (S) exists then
       PUSH S
       S = Right Branch (S)
       Traverse Tree (S)
       S = POP
  4) Return
```

Algorithm 2 is a "recursive" procedure because it calls itself. When programmed in Basic, a stack is used to keep track of the return positions within the tree. To traverse the tree in Figure 3, S is set to 1. Since (1) has a left branch, we place 1 on a stack and descend to (2) by setting S to 2. The stacks looks like

1

Since (2) has a left branch, (2) is placed on the stack and the algorithm descends to (3).

2
1

(3) has no left branch so the algorithm goes to step 3 and prints A. Since there is no right branch it simply moves back up to the previous node by popping (2) from the stack, and returning to step 1 of the original call in Algorithm 2. B is printed, and then at step 4, the algorithm descends the right branch.

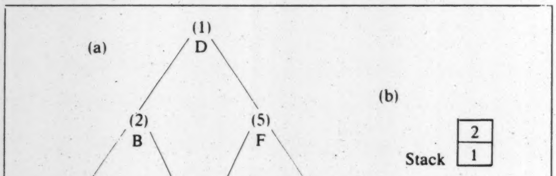
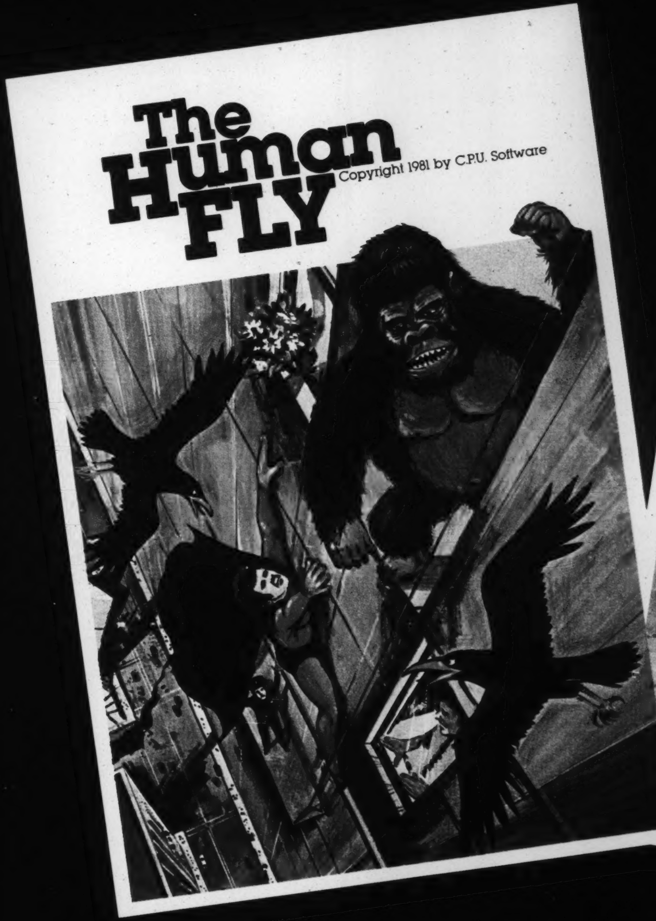


Figure 3. Traversing a tree. A stack based algorithm (see Algorithms 1 and 2) reads the tree from left to right. It descends down the tree as far as it can along left branches. At each mode it places a return point on the stack. At (b) the algorithm has reached node (3) where it prints A. It then pops the return node (2) from the stack and climbs back up the tree to (3) to print B. Then it descends to the right and prints C. Finally it returns to (1) and descends the right branch of node (1).

C.P.U. SOFTWARE



OIL RIG
By Kevin Bagley
Copyright 1982 By
COMPUTER PROGRAMS UNLIMITED

The HUMAN FLY

Can you climb the World's Tallest Building? As you climb, the dangers increase.

Watch for angry police, menacing gorillas, earth shaking earthquakes, unpredictable birds, falling flower pots, and an occasional rising balloon (catch it and get a free ride up).

Elevation indicator shows where you are on the building.

Will you be a HUMAN FLY or a MOLE HILL CLIMBER? Find out in THE HUMAN FLY by Kevin Bagley.

HIRES action, SUPER SOUND, ASSEMBLY LANGUAGE, THE NEXT GENERATION OF COMPUTER GAMES.

48K APPLESOFT — 3.3 DOS

29.95 + shipping & handling or see your favorite dealer and ask for The HUMAN FLY by KEVIN BAGLEY.

OIL RIG*

Are you the next 'J.R.' of the Oil industry??? Find out in OIL RIG!

An entirely new concept in gaming.

The Oil Market is constantly changing, even while you are typing in your transactions. Build your 'DYNASTY' to where you can prospect for oil, then drill for the moving pool of oil. Maybe even buy an offshore drilling platform.

Watch your cash flow — if your refinery explodes or your platform sinks, or??????????

9 skill levels and variable game lengths.

HIRES action, SUPER SOUND, ACTIVATED TEXT, ASSEMBLY LANGUAGE, THE NEXT GENERATION OF COMPUTER GAMES

48K APPLESOFT — 3.3 DOS

29.95 + shipping & handling or see your favorite dealer and ask for OIL RIG By KEVIN BAGLEY

*Featured front page Wall Street Journal — April 22, 1982.

COMPUTER PROGRAMS UNLIMITED
9710 - 24th Ave. S.E. Everett, Washington 98204 (206) 337-5888

CIRCLE 148 ON READER SERVICE CARD

WHY THE MICROSOFT RAMCARD™ MAKES OUR SOFTCARD™ AN EVEN BETTER IDEA.

Memory — you never seem to have quite enough of it.

But if you're one of the thousands of Apple owners using the SoftCard, there's an economical new way to expand your memory dramatically.

16K ON A PLUG-IN CARD.

Microsoft's new RAMCard simply plugs into your Apple II,® and adds 16k bytes of dependable, buffered read/write storage.

Together with the SoftCard, the RAMCard gives you a 56k CP/M® system that's big enough to take on all kinds of chores that would never fit before (until now, the only way to get this much memory was to have an Apple Language Card installed).

GREAT SOFTWARE: YOURS, OURS, OR THEIRS.

With the RAMCard and SoftCard, you can tackle large-scale business and scientific computing with our COBOL and FORTRAN languages. Or greatly increase the capability of CP/M applications like the Peachtree Software accounting systems. VisiCalc™ and other Apple software packages can take advantage of RAMCard too.

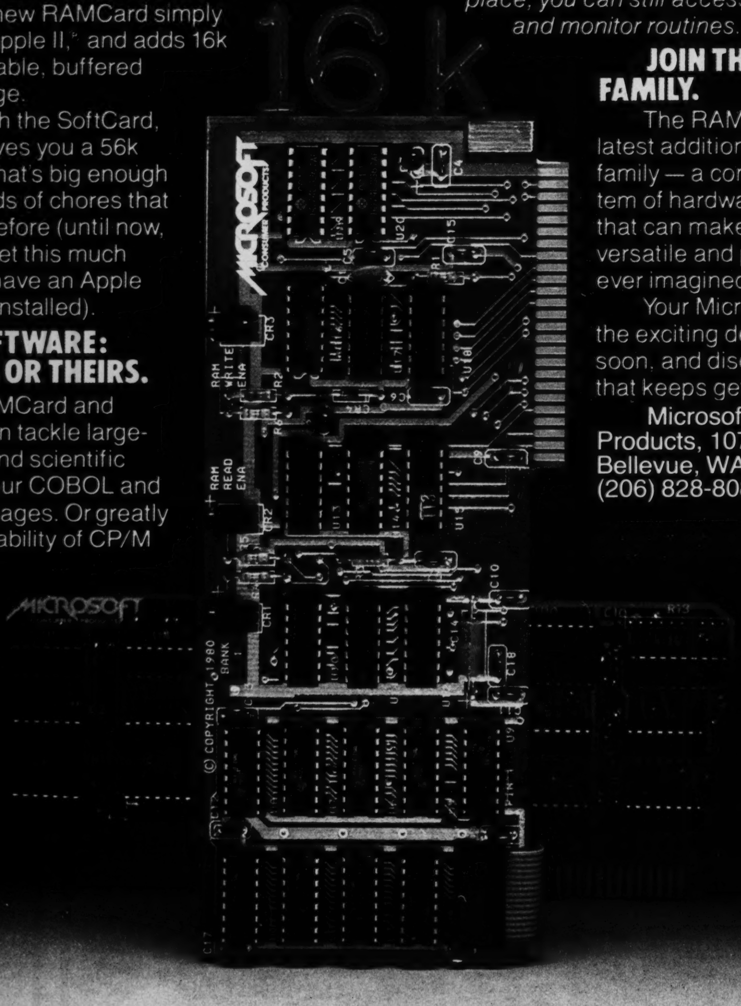
And RAMCard gives you the extra capacity to develop advanced programs of your own, using the SoftCard and CP/M. *Even with the RAMCard in place, you can still access your ROM BASIC and monitor routines.*

JOIN THE SOFTCARD FAMILY.

The RAMCard is just the latest addition to the SoftCard family — a comprehensive system of hardware and software that can make your Apple more versatile and powerful than you ever imagined.

Your Microsoft dealer has all the exciting details. Visit him soon, and discover a great idea that keeps getting better.

Microsoft Consumer Products, 10700 Northup Way,
Bellevue, WA 98004,
(206) 828-8080.



MICROSOFT

CIRCLE 221 ON READER SERVICE CARD

A Practical Application

Part Two described a genealogical database used for making pedigree charts. The design is based on a tree structured database that provides a natural representation for the problem. The three commands provided by the program are: "Add" to add new ancestors into the database, "Print" to display some or all of the ancestors, and "Change" to modify and update the data file.

The genealogical program is split into several subroutines summarized in Table 1. The major routines Add new ancestor, Print out pedigree chart, and Change data records, provide the user interface, prompting for data, and displaying the results.

Line	Subroutine
100	Select command
1000	Add new ancestor
2000	Print out pedigree chart
3000	Print the name at record R
3500	Print the name and information at record R
4000	Change data records
5000	Perform tree search to find an ancestor
6000	Expand short-hand relationship specification
7000	Open data file
8000	Read record R
9000	Write record R
10000	Update and close file
11000	Exit program

Table 1. Genealogical Program Subroutines.

When a name is added, the program performs a search on the data file looking for the specified relationship. All searches begin at logical record 1. The relationship F means locate the record pointed to by the "father" field of record 1. The notation MF means jump to the mother record, pointed to by the "mother" field and then to the "father" record specified by the "father" field in the "mother's record.

To add a new ancestor, you enter the ancestor's relationship to you. Your grandfather is your father's father, or FF for this program. The search routine sees if that ancestor is already in the tree. If not, a new record is created, and the "father" field of the your father's record is set to point to the new record.

Changing records is fairly easy. After entering the relationship, the search routine locates the correct record. The data is displayed, and you may make changes as necessary. When complete, the updated record is written back to disk.

The Print routine uses some interesting data structure techniques. Any individual in the tree may be displayed. Or, pedigree charts for any individual may be printed. A pedigree chart for the person at the root of the tree includes all of his ancestors.

Entering FMF prints the record corresponding to your great-grandfather. If you wish to see a pedigree chart for your great-grandfather, enter FMF+, meaning display FMF *plus* all of his ancestors. The same notation can limit the size of the pedigree chart. FMF+1 means display FMF plus one more generation, which is his parents. FMF+2 displays both his parents and his grandparents.

The program shown in Listing 4 is limited to 16 generations because of the use of integers for the father and mother pointer fields. Additionally, each record requires 128 bytes of storage, which means only about 780 ancestors can be entered per 100K of disk storage. For many people that is not a severe limit, but for others it may be very constraining.

One alternative is to keep just the names on the disk file, with perhaps an index number identifying an external record of the ancestor. That would expand the storage capability to over 3000 names per 100K of disk storage. Also, when extending the pedigree chart back many generations, it might be best simply to create a separate database starting at, say, the eighth generation.

Summary

The lack of dynamic memory allocation in Basic requires that data structures be set up within fixed size arrays. Stacks and queues are easily programmed by using an array and one or more pointer variables.

On the other hand, lists and trees both require several arrays and complex programming to link all the elements together. But without data structure techniques, the genealogical database would be difficult to build and probably quite slow to operate.

Next month, several sorting techniques, including Shellsort and Quicksort, will be discussed. Quicksort is an especially fast sort algorithm, well suited to sorting large tables of randomly distributed records.

References

Gorney, Len, "Queuing Theory, the Science of Wait Control, Part 1: Queue Representation," *Byte*, Vol 4, No. 4, April 1979, p. 132.

_______"Queuing Theory, the Science of Wait Control, Part 2: System Types," *Byte*, Vol. 4, No. 5, May, 1979, p. 176.

Knuth, Donald E., *The Art of Computer Programming: Fundamental Algorithms*, Vol. 3, Addison-Wesley Publishing Co, Reading, MA, 1973.

Standish, Thomas A., *Data Structure Techniques*, Addison-Wesley Publishing Co, Reading, MA 1980.

Swanson, Paul, "PDQ: A Data Manager for Beginners, Don't Reinvent the Wheel," *Byte*, Vol. 6, No. 11, Nov. 1981, p. 236. □

Listing 1. Subroutines to add to and remove elements from a queue. To add a new element, set D$ to the value to be added and execute a GOSUB 2000. To remove a value, execute a GOSUB 3000. D$ will be set to the removed element.

```
1000 REM - INITIALIZE QUEUE
1010 H = 1: T = 0: N = 0
1020 RETURN
2000 REM - ADD ELEMENT TO THE QUEUE
2010 IF N = MAX THEN F = 1: RETURN ELSE F=0
2020 N = N + 1
2030 T = T + 1
2040 IF T > MAX THEN T = 0
2050 Q$(T) = D$
2060 RETURN
3000 REM - REMOVE ELEMENT FROM THE QUEUE
3010 IF N = 0 THEN F = 2: RETURN ELSE F=0
3020 D$ = Q$(H)
3030 N = N - 1
3040 H = H + 1
3050 IF H > MAX THEN H = 1
3060 RETURN
```

Listing 2. Several routines to create and manipulate list structures in Basic.

```
10 MAX=100
20 DIM N$(MAX), N(MAX), P(MAX)
30 GOSUB 1000
40 PRINT "ENTER A(DD R(EMOVE D(ISPLAY Q(UIT ? ";
50 C$=INPUT$(1): PRINT C$
60 ON INSTR(1,"ARDQ",C$)+1 GOSUB 40,80,130,170,32767
70 GOTO 40
80 INPUT "ENTER LOCATION ? ",G
90 INPUT "ENTER NAME ? ",S$
100 GOSUB 2000
110 IF F>0 THEN PRINT "ERROR ",F
120 RETURN
130 INPUT "REMOVE WHAT LOCATION ? ",G
140 GOSUB 3000
150 IF F>0 THEN PRINT "ERROR ",F
160 RETURN
170 GOSUB 4000
180 PRINT "TRACE OF LIST CONTROL INFORMATION"
190 PRINT "FREE SPACE LIST -"
200 P=U1
210 IF P=0 THEN GOTO 230
220 PRINT P,: P=N(P): GOTO 210
230 PRINT : PRINT "USED SPACE LIST-"
240 PRINT "HEAD=";H,"TAIL=";T
250 P=H
```

Listing 2, continued...

```
260 IF P=0 THEN RETURN
270 PRINT "ELEMENT ";P
280 PRINT "NAME=",N$(P),"PREVIOUS=";P(P),"NEXT=";N(P)
290 P=N(P)
300 GOTO 260
1000 REM - INITIALIZE QUEUE
1009 REM - SET UP LIST OF UNUSED SPACE
1010 FOR I = 1 TO MAX
1020 N(I)=I+1
1030 NEXT I
1040 N(MAX)=0
1049 REM - INITIAL UNUSED SPACE LIST HEAD AND TAIL POINTERS
1050 U1=1: U2=MAX
1060 RETURN
2000 REM - ADD ELEMENT TO THE LIST AT POSITION G
2010 IF N=MAX THEN F=1: RETURN ELSE F=0
2029 REM - GET A FREE LOCATION FROM THE UNUSED SPACE LIST
2030 L=U1
2040 IF U1 = U2 THEN U1 = 0: U2 = 0  ELSE  U1 = N (U1)
2050 N$(L)=S$
2059 REM - ADJUST THE PREVIOUS POINTER OF ADJACENT ELEMENT
2060 IF G>0 THEN IF N(G) > 0 THEN P(N(G))=L
2069 REM - SET UP L'S NEXT AND PREVIOUS POINTERS
2070 IF G>0 THEN N(L)=N(G) ELSE N(L)=0
2080 IF G>0 THEN N(G)=L
2084 REM - SPECIAL CASE: INSERTING BEFORE THE HEAD OF A LIST
2085 IF G=0 AND N>0 THEN P(H)=L: N(L)=H
2090 IF G=0 THEN P(L)=0 ELSE P(L)=G
2095 N=N+1
2099 REM - IF THE INSERT AFFECTS THE HEAD OR TAIL, THEN UPDATE H OR T
2100 IF N=1 OR G=T THEN T=L
2120 IF G=0 THEN H=L
2130 RETURN
3000 REM = REMOVE ELEMENT AT LOCATION G
3010 IF N = 0 THEN F = 2: RETURN ELSE F = 0
3019 REM - UPDATE THE HEAD OR TAIL POINTERS IF DELETING THE HEAD OR TAIL
3020 IF H=G THEN H=N(G)
3030 IF T=G THEN T=P(G)
3040 N = N - 1
3049 REM - UPDATE THE NEXT AND PREVIOUS POINTERS OF ADJACENT ELEMENTS
3050 IF N(G) > 0 THEN P(N(G)) = P(G)
3060 IF P(G) > 0 THEN N(P(G)) = N(G)
3069 REM - PLACE THE DELETED ELEMENT ON THE FREE SPACE LIST
3070 IF U2=0 THEN U1=G: U2=G ELSE N(U2) = G
3080 P(G)=0
3090 U2=G
3100 N(U2)=0
3120 RETURN
4000 REM - DISPLAY LIST
4010 P = H
4020 IF P = 0 THEN PRINT: RETURN
4030 PRINT N$(P),
4040 P = N (P)
4050 GOTO 4020
4060 RETURN
32767 END
```

Listing 3. Routines to add names to a tree structure, and to search and display the tree are shown.

```
10 MAX=100
20 DIM N$(MAX), L(MAX), R(MAX), S(20): REM -S() IS STACK NEEDED TO DISPLAY TREE
30 GOSUB 1000
40 PRINT "ENTER A(DD S(EARCH D(ISPLAY L(IST Q(UIT ? ";
50 C$=INPUT$(1): PRINT C$
60 ON INSTR(1,"ASDLQ",C$)+1 GOSUB 40,80,130,120,170,32767
70 GOTO 40
80 INPUT "ENTER NAME ? ",S$
90 GOSUB 3000
100 IF F>0 THEN PRINT "ERROR ",F
110 RETURN
120 GOSUB 4000:RETURN
130 INPUT "SEARCH FOR WHAT NAME ? ",S$
140 GOSUB 2000
150 IF F=0 THEN PRINT S$;" IS IN THE LIST AT ";G ELSE PRINT "ERROR ";F
160 RETURN
170 PRINT "ROOT = ";R
180 FOR I=1 TO N
190 PRINT I;N$(I), "LEFT=",L(I),"RIGHT=",R(I)
200 NEXT I
210 RETURN
1000 REM - INITIALIZE TREE
1010 R=0: REM - SET ROOT OF TREE TO NIL
1020 RETURN
1030 RETURN
2000 REM - SEARCH THE TREE FOR NAME S$
2010 G = R: G1 = R
2020 IF G = 0 THEN F=1: G=G1: RETURN
2030 IF S$ = N$(G) THEN F=0: RETURN
2040 G1=G
2050 IF S$ < N$(G) THEN G = L(G) ELSE G = R(G)
2060 GOTO 2020
3000 REM - ADD A NAME S$ TO THE TREE
3010 IF N= MAX THEN F=4: RETURN
3020 GOSUB 2000: REM - SEE IF THE NAME IS ALREADY IN THE TREE
3030 IF F=0 THEN F=2: RETURN ELSE F=0
3040 N = N + 1
3050 IF G=0 THEN R=N ELSE IF S$ > N$(G) THEN R(G)=N ELSE L(G)=N
3060 N$(N) = S$
3070 RETURN
4000 REM - DISPLAY THE ENTRIES IN THE TREE
4010 G=R: P=0: REM - P IS THE STACK POINTER
4020 IF L(G) <>0 THEN S(P)=G: P=P+1: G=L(G): GOSUB 4020: P=P-1: G=S(P)
4030 PRINT N$(G)
4040 IF R(G)<>0 THEN S(P)=G: P=P+1: G=R(G): GOSUB 4020: P=P-1: G=S(P)
4050 RETURN
32767 END
```

Listing 4.

```
1 ' Pedigree Chart Utility program
2 ' Edw. Mitchell, 16 Feb 1982
3 '
4 '
5 '
10 DIM S%(20)            ' Stack needed when traversing the tree
20 GOSUB 7010            ' open up data file
100 PRINT "Geneological Pedigree Chart Maker"
110 PRINT
120 PRINT "Enter:  A(dd  P(rint  C(hange  Q(uit ? ";
130 C$=INPUT$(1): PRINT C$
140 ON INSTR("APCQ",C$)+1 GOSUB 160, 1010, 2010, 4010, 11010
150 GOTO 110
160 RETURN
1000 '---------------------------------------
1010 PRINT
1020 IF N%=0 THEN PRINT "Enter your name -" ELSE PRINT "Add New Ancestor"
1030 PRINT
1040 IF N%>0 THEN INPUT "Specify relationship (CR=Exit)? ", R$ ELSE R$="FO"
1050 IF R$="" THEN RETURN
1060 GOSUB 6010
1070 GOSUB 5010
1075 IF N%>0 AND G%<>0 THEN PRINT "That ancestor already exists": GOTO 1030
1080 IF E% THEN IF E%<>LEN(R$) THEN PRINT "That generation is too distant": GOTO
 1040
1090 N%=N%+1         .    ' Increment total # of entries
1100 PRINT "Enter name ? ";: LINE INPUT ANCESTORNAME$
1120 INPUT "Enter birth date ? ", BDATE$
1130 PRINT "Enter Place of Birth ? ";: LINE INPUT BPLACE$
```

V new for Apple II™

I. APPLEsurance II. . .

DUAL AUTOMATIC DIAGNOSTIC AND ASSURANCE SYSTEM

The only double-safe system now available for insuring the reliability, integrity, and dependability of your Apple II and peripherals. Identify problems before you lose time and data. APPLEsurance II includes:

(1) A standard disk controller card which also automatically runs sophisticated diagnostic routines on basic system hardware each time you power-up. Descriptive error messages indicate any problem areas and, in some cases, the specific chip or component that's responsible.

(2) Disk based diagnostic and assurance tests for further and more extensive checks of the basic hardware plus elaborate standard and optional analysis of peripheral cards and sub-systems.

APPLEsurance II suggested list prices:

Complete System with Disk Controller Card and Disk Based Software	**$150.00**
Disk Controller Card with Power-Up Diagnostics only	**$125.00**
Disk Based Software only	**$50.00**

IV. VERSAcard. . .

FOUR CARDS ON ONE + TWO NEW OPTIONS

NOW! The four separate card functions – with true simultaneous operation – that made VERSAcard the preferred multifunction card for Apple II – (1) Serial Input/Output Interface (2) Parallel Output Interface, (3) Precision Clock Calendar, and (4) BSR Control – PLUS NEW OPTIONS: Screen Dump Graphics ROM and BSR Time and Event Program.

VERSAcard suggested list price **$199.00**
Options extra.

II. GRAPHITTI. . .

GRAPHICS/PARALLEL PRINTER CARD

Sophisticated text and graphic routines available via simple keyboard commands. Avoid "squashed" printouts. GRAPHITTI on-board firmware lets you utilize the Apple high resolution graphic screens – circles are printed as circles. Use with most of today's popular dot-matrix printers. Graphic support for Epson, Okidata, NEC 8023, C-Itoh Prowriter, and IDS Prism. Compatible with most software packages including PFS:Graph,™ CP/M,™ and Apple Pascal.™

Firmware 'text' features include: Set Line width via standard ^InN format, Enable or Disable Line Feed after Carriage Return, Set Lines per Page, Set Left Margin, Set or Clear 8th Bit, Print High Resolution Page 1 and/or 2, Double Size, Emphasized Mode, Inverse Mode, Rotate 90 Degrees, Specify Left Margin. . . and more.

GRAPHITTI Graphics/Parallel Printer Interface Suggested list **$125.00**

V. EXPAND–A–RAM. . .

16K to 128K EXPANDABLE RAM CARD

A low cost solution to future larger memory needs. Start with 16K (**$225**), 32K (**$249**), or 64K (**$375**), and expand to 128K later. Or, simply order the full 128K size now (**$495**). No Apple modification required. All cards include memory management software, ram test, and utility functions. Disk Emulators for Apple DOS,™ Apple Pascal,™ and CP/M™ available. Optional: Expand Visicalc™ to 128K and 80 column format.

Apple II is a registered trademark of Apple Computer, Inc.

III. VERSAbox. . .

THE ONLY INTELLIGENT SPOOLER/BUFFER WITH AN OPTIONAL REAL TIME CLOCK INTERFACE DISPLAY

For use with all Centronics parallel and RS-232C INPUT/OUTPUT interfaces. VERSAbox's high-speed input combined with up to 60K buffer (more with character compression) frees up your computer from the slow job of printing. Modems and other compatible devices can also be buffered. Multiple software selectable outputs permit you to choose between two or more VERSAbox outputs or use them simultaneously. You can buffer multiple inputs simultaneously too.

Add the optional REAL TIME CLOCK to VERSAbox and you get a six digit LED numeric time display. Your computer can read the time via the RS-232C port. Another useful option is the SWITCHED 120V SOCKET that can turn external devices on and off by clock control.

Cabinet is 11"W, 8"D, 8"H. VERSAbox suggested list price with 16K buffer
$249.00 Options extra.

PROMETHEUS

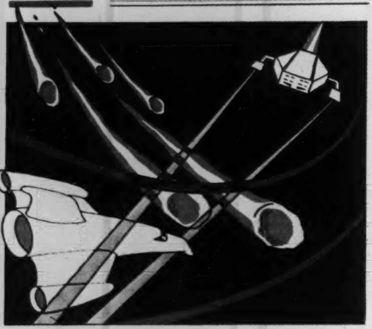
PROMETHEUS PRODUCTS INCORPORATED
45277 Fremont Blvd. • Fremont, CA 94538 • (415) 490-2370

CIRCLE 253 ON READER SERVICE CARD

Great Games From Piccadilly Software Inc.

™ **Piccadilly Software**
Presents

Star Blaster

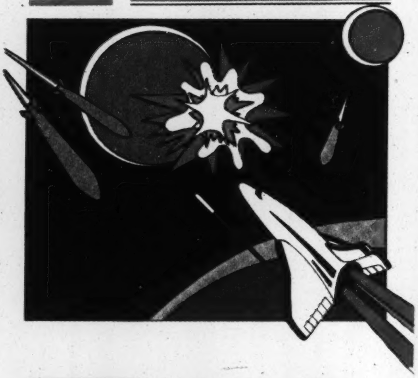


™ **Piccadilly Software**
Presents

Falcons

™ **Piccadilly Software**
Presents

Warp Destroyer



™ **Piccadilly Software**
Presents

Survival

™ **Piccadilly Software**
Presents

Suicide!

™ **Piccadilly Software**
Presents

Succession

COMING IN THE 2ND HALF OF 1982

Available at your local dealer.

Requires: APPLE II/APPLE II PLUS with 48K in Dos 3.3 or 3.2 • APPLE III

Piccadilly Software Inc. • 89 Summit Avenue • Summit, N.J. 07901 • (201) 277-1020

If you're unable to obtain Piccadilly Games from your local dealer, send $29.95 per game plus $1.50 per order for postage and handling. NJ residents add 5% sales tax. Outside US, send $3.00 per order for shipping.

*Apple is a registered trademark of Apple Computer Inc.

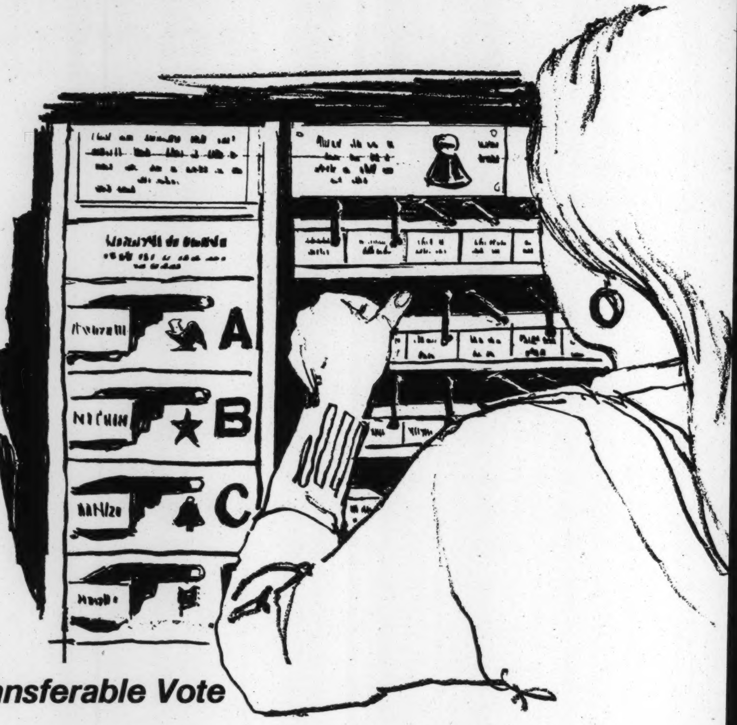
CIRCLE 319 ON READER SERVICE CARD

Listing 4, continued...

```
1140 INPUT "Enter Death Date ? ", DDATE$
1150 PRINT "Enter Place of Death ? ";: LINE INPUT DPLACE$
1160 IF L%=0 THEN L%=1  ' Special case of entering first name
1170 R%=L%: GOSUB 8030  ' Read the record
1180 IF RIGHT$(R$,1)="M" THEN MOTHER%=N% ELSE FATHER%=N%
1190 GOSUB 9020         ' Write out descendant's record
1200 FATHER%=0: MOTHER%=0 ' Build record for this ancestor
1210 LSET BIRTHDATE$=BDATE$
1220 LSET BIRTHPLACE$=BPLACE$
1230 LSET DEATHDATE$=DDATE$
1240 LSET DEATHPLACE$=DPLACE$
1250 LSET ANCESTOR$=ANCESTORNAME$
1260 R%=N%              ' Write out the new record
1270 GOSUB 9020
1280 GOTO 1030
2000 '--------------------------------------
2010 PRINT
2020 PRINT "Print Pedigree Chart"
2030 PRINT
2040 INPUT "Enter relationship (+ for all, CR=Exit) ? ",R$
2050 IF R$="" THEN RETURN
2055 IF LEFT$(R$,1)="P" THEN R$=MID$(R$,2): PRINTER%=1: LPRINT CHR$(15): LPRINT
     ELSE PRINTER%=0
2060 I%=INSTR(R$,"+")    ' Check for depth specification
2070 IF I%=0 THEN ALL%=0: GOTO 2110 ELSE ALL%=1
2080 DEPTH%=VAL(MID$(R$,I%+1))
2090 R$=LEFT$(R$,I%-1)
2100 IF DEPTH%=0 THEN DEPTH%=16
2110 GOSUB 6010: GOSUB 5010
2115 IF ALL%=0 THEN R%=L%: GOSUB 3500: GOTO 2030
2120 IF E% OR G%=0 THEN PRINT "Relationship not found": GOTO 2030
2125 GOSUB 2130: GOTO 2030
2130 R%=G%
2140 P%=0               ' Set Stack pointer to 0
2150 GOSUB 8030         ' Read the record
2160 IF P% < DEPTH% THEN IF FATHER% <> 0 THEN S%(P%)=R%: P%=P%+1: R%=FATHER%: GO
     SUB 2150: P%=P%-1: R%=S%(P%)
2170 GOSUB 3010
2180 IF P%<DEPTH% THEN IF MOTHER%<>0 THEN S%(P%)=R%: P%=P%+1: R%=MOTHER%: GOSUB
     2150: P%=P%-1: R%=S%(P%)
2190 RETURN
3000 '--------------------------------------
3010 'Print Entry At Record R%
3020 GOSUB 8030
3030 PRINT TAB(P%*5);ANCESTOR$
3035 IF PRINTER% THEN LPRINT TAB(P%*5);ANCESTOR$: LPRINT
3060 PRINT
3070 RETURN
3500 '--------------------------------------
3510 ' Print all of record R%
3520 GOSUB 8030
3525 PRINT
3530 PRINT ANCESTOP$
3540 PRINT "Born:  "; BIRTHDATE$; TAB(20); "Place:  "; BIRTHPLACE$
3550 PRINT "Died:  "; DEATHDATE$; TAB(20); "Place:  "; DEATHPLACE$
3560 IF PRINTER%=0 THEN RETURN
3565 LPRINT ANCESTOR$
3570 LPRINT "Born:  "; BIRTHDATE$; TAB(20); "Place:  "; BIRTHPLACE$
3580 LPRINT "Died:  "; DEATHDATE$; TAB(20); "Place:  "; DEATHPLACE$
3590 LPRINT
3600 RETURN
4000 '--------------------------------------
4010 PRINT
4020 PRINT "Update Data"
4030 PRINT
4040 INPUT "Enter relationship to update (CR=Exit) ? ", R$
4050 IF R$="" THEN RETURN
4060 GOSUB 6010
4070 GOSUB 5010
4080 IF E% OR N%=0 THEN PRINT "That ancestor does not exist": GOTO 4040
4090 R%=L%
4100 GOSUB 3500
```

```
4110 PRINT
4120 PRINT "Enter new name (CR if no change)? "; : LINE INPUT ANCESTORNAME$
4130 INPUT "Enter new birth date ? ", BDATE$
4140 PRINT "Enter new place of birth ? ";: LINE INPUT BPLACE$
4150 INPUT "Enter new death date ? ",DDATE$
4160 PRINT "Enter new place of death ? ";: LINE INPUT DPLACE$
4170 IF ANCESTORNAME$<>"" THEN LSET ANCESTOR$=ANCESTORNAME$
4180 IF BDATE$<>"" THEN LSET BIRTHDATE$=BDATE$
4190 IF BPLACE$<>"" THEN LSET BIRTHPLACE$=BPLACE$
4200 IF DDATE$<>"" THEN LSET DEATHDATE$=DDATE$
4210 IF DPLACE$<>"" THEN LSET DEATHPLACE$=DPLACE$
4220 GOSUB 9020
4230 GOTO 4030
5000 '--------------------------------------
5010 'Lookup ancestor specified by R$
5011 'Return L% as location of descendant if not found
5012 'else, G% is the ancestor.  E% is an error code.
5020 G%=1: L%=0: I%=1: E%=0
5030 IF R$="" THEN L%=1: RETURN
5040 L%=G%: R%=G%: GOSUB 8030
5050 IF MID$(R$,I%,1)="M" THEN G%=MOTHER% ELSE G%=FATHER%
5060 IF G%=0 THEN IF I%<=LEN(R$) THEN E%=I%: RETURN ELSE E%=0: RETURN
5070 I%=I%+1
5080 IF I%>LEN(R$) THEN E%=0: L%=G%: RETURN
5090 GOTO 5040
6000 '--------------------------------------
6010 'Expand short hand relationship notation into standard notation
6020 I%=2
6030 IF I%>LEN(R$) THEN RETURN
6040 IF INSTR("0123456789",MID$(R$,I%,1))=0 THEN I%=I%+1: GOTO 6030
6050 D%=ASC(MID$(R$,I%,1))-48
6060 D$=MID$(R$,I%-1,1)
6070 R$=LEFT$(R$,I%-2)+STRING$(D%,ASC(D$))+MID$(R$,I%+1,LEN(R$)-I%)
6080 I%=I%+D%
6090 GOTO 6030
7000 '--------------------------------------
7010 ' Open Data File
7020 E%=0
7030 ON ERROR GOTO 7120 ' See if the file already exists
7040 OPEN "I",#1,"ANCESTRY"
7050 CLOSE 1
7060 ON ERROR GOTO 0
7070 OPEN "R",#1, "ANCESTRY", 128
7080 FIELD #1, 2 AS FATHER$, 2 AS MOTHER$, 12 AS BIRTHDATE$, 12 AS DEATHDATE$,
     29 AS BIRTHPLACE$, 29 AS DEATHPLACE$, 32 AS ANCESTOR$
7090 FIELD #1, 2 AS NUMENTRIES$
7100 IF E% THEN N%=0 ELSE GET #1, 1: N%=CVI(NUMENTRIES$)
7110 RETURN
7120 E%=1               ' File didn't exist - so create it
7130 RESUME 7060
8000 '--------------------------------------
8010 ' Read Record R%
8020 'READ RECORD R%
8030 GET #1, R%+1
8040 FATHER%=CVI(FATHER$)
8050 MOTHER%=CVI(MOTHER$)
8060 RETURN
9000 '--------------------------------------
9010 ' Write Record R%
9020 LSET FATHER$=MKI$(FATHER%)
9030 LSET MOTHER$=MKI$(MOTHER%)
9040 PUT #1, R%+1
9050 RETURN
10000 '-------------------------------------
10010 ' Update and Close File
10020 LSET NUMENTRIES$=MKI$(N%)
10030 PUT #1, 1
10040 CLOSE 1
10050 RETURN
11000 '-------------------------------------
11010 GOSUB 10020       ' Close File
11020 END
```

Making Every Vote Count



A Program to Tally the Single Transferable Vote

Jim Parr

Democracy is a wonderful thing, but it is not always easy to know how to achieve it. The usual ways of voting sometimes lead to results that just don't seem right. Too many good candidates on one side of an issue can split the vote for that side and throw the election to the other side, even if that other side is favored by the minority. When a committee or council is elected, it is possible for a bare majority, or even just a plurality, to win all the seats, leaving a substantial part of the population without any of their candidates elected. If your favorite doesn't seem to be one of the leading candidates, you may feel compelled to vote for someone you don't like nearly as well.

All of these inequities involve situations in which for some reason, someone's vote doesn't count, or is in danger of being "wasted." That is not just tough luck, or a necessary part of politics; it is a result of the election system.

There is no way for everyone to win, but there is a system that guarantees that everyone's vote will have an effect. It is described here with a program to help do the tallying it requires. If it sounds attractive to you, you may want to propose it in some organization to which you belong.

The System

Of the many methods devised to try to make elections fairer, the most elegant is that of the Single Transferable Vote (STV). We often use the idea of a transferable vote in electing a committee during a meeting: we take a vote among the candidates, eliminate the one with the fewest votes, and vote again.

Once your favorite candidate is eliminated, you get to transfer your vote to your next choice. Besides that kind of transfer, STV also allows transfer of surplus votes of a winning candidate, thus reducing the chance of the majority being underrepresented if they all vote for the same candidate.

Under STV, each voter ranks the candidates in order of preference. A series of tabulations or tallies follows, similar to the series of votes taken in the example of the meeting; except that they are all done from the ballots, so that the voters don't have to be present when the counting is done.

If there are no more surplus points to redistribute, then we eliminate the trailing candidate, the one with the fewest points currently assigned. If my ballot has some points assigned to the trailing candidate, who is my Nth choice, then those points are transferred to my (N + 1)st choice. Surpluses are reassigned first because they may affect who is eliminated. Ties between trailing candidates are decided at random.

This process continues—if there is a surplus, redistribute it; if not, eliminate the trailing candidate—until all the positions are filled.

Results

From your standpoint as voter, the effect is that your entire vote counts. Any part of your vote that your candidate can't use is transferred to your next choice. Voting for a "dark horse" doesn't waste your vote; if he loses, your vote goes to your next choice. Even if all your favorites eventually lose, your vote is in there to the last, if only to express your preference between the two candidates you liked least. Failing to rank all the candidates is the only way that part of your vote could end up not counting.

From the standpoint of the election as a whole, voting blocs (such as parties) will win seats approximately in proportion to their voting strength. Thus STV is one of the methods of achieving "proportional representation." This is in contrast to the usual at-large plurality rules in which a bloc of 49% can be denied representation.

In an election for a single office, "in proportion to their voting strength" means that a candidate cannot win until he has accumulated a majority of the points in the election, including points transferred from losers. A candidate supported only by a minority cannot win the office.

Jim Parr, Mathematics Department, Illinois State University, Normal, IL 61761.

Move up to Microsystems

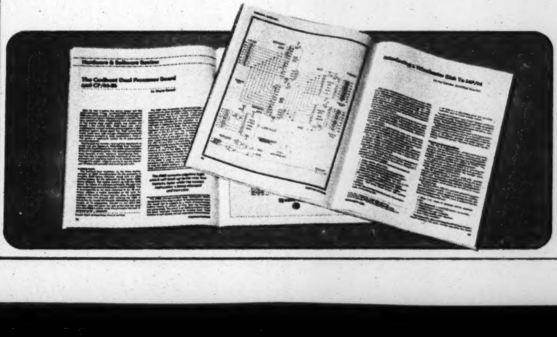
THE JOURNAL FOR SOPHISTICATED MICROCOMPUTER USERS.

Microsystems is not, in any sense, for beginners. Unlike "personal computer" magazines, *Microsystems* is written *exclusively* for expert users and designers in the software and support hardware field.

If you need a reliable, high-level, up-to-date journal devoted to CP/M,® MP/M,® MS-DOS,™ UNIX,® XENIX,™ OASIS and other operating systems, then *Microsystems* is for you. We feature tutorials on the modification and special use of systems, offer short-cut routines, show you debugging procedures, techniques for interfacing, and much more. Our one purpose is to keep the advanced microcomputer professional at the leading edge of DOS development and use.

In a few recent issues of Microsystems you would have seen:

- Reviews of four C compilers: BDS C, Small C, tiny c TWO™ and Whitesmiths C.
- A programming style comparison: Digital Research PL/I-80™ vs. Microsoft BASIC.
- Twenty-seven 16-Bit DOS compared.
- Virtual segment procedures under UCSD Pascal.
- An in-depth look at MP/M-80 II.™
- A simple 6-byte hexadecimal ASCII conversion routine.
- Using CP/M's undocumented "Autoload" feature.
- An explanation of double density disk controllers.
- A comparison of five popular S-100 disk controller cards.
- OS-1—a UNIX-like DOS with a CP/M adapter.



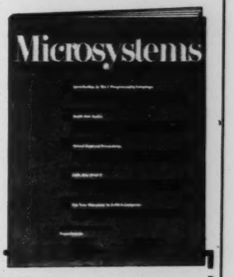
Every issue of *Microsystems* keeps you at the forefront of the industry in customizing software and adapting hardware to meet new requirements and standards. You'll also find industry news, book and new product reviews, plus our regular *Software Directory* listing newly available programs.

To get the high-level systems information you want, join the club of serious microcomputer professionals who subscribe to *Microsystems.* Use the coupon below to order, and save up to 33%!

PROFESSIONALS PLEASE NOTE:

Your subscription to Microsystems may be tax deductible. Check with your accountant.

Trademarks:
XENIX: Microsoft; tiny c TWO: tiny c assoc.; PL/I-80, MS-DOS, MP/M-80 II: Digital Research.
Registered Trademarks:
CP/M, MP/M: Digital Research; UNIX: Bell Laboratories.



Microsystems CN 1987
Morristown, New Jersey 07960

YES, enter my subscription to *Microsystems* for:

☐ 12 issues at $19.97—I save 20%.
☐ 24 issues at $36.97—I save 26%.
☐ 36 issues at $49.97—I save 33%.

Savings based on full 12-issue subscription price of $24.97.

Mr.
Ms. ______________________ 8H08
(please print full name)
Company ______________________
Address ______________________
City ______________________
State ______________ Zip ______________

CHECK ONE: ☐ Payment enclosed. ☐ Bill me later.

Offer valid in U.S. and possessions only. Please allow 30 to 60 days for delivery of first issue. Satisfaction guaranteed or a prompt refund for unmailed issues.

NEW SUBSCRIBERS ONLY

Figure 1.

```
SAMPLE ELECTION
Here are the five ballots.

Rank recorded beside name:
ARNOLD_2_   ARNOLD_3_   ARNOLD_1_   ARNOLD_4_   ARNOLD_4_
BAKER__1_   BAKER__1_   BAKER__2_   BAKER__5_   BAKER__5_
MEYER__4_   MEYER__4_   MEYER__4_   MEYER__1_   MEYER__2_
MORENO_5_   MORENO_5_   MORENO_5_   MORENO_2_   MORENO_1_
PARK___3_   PARK___2_   PARK___3_   PARK___3_   PARK___3_

Names in preference order:
BAKER       BAKER       ARNOLD      MEYER       MORENO
ARNOLD      PARK        BAKER       MORENO      MEYER
PARK        ARNOLD      PARK        PARK        PARK
MEYER       MEYER       MEYER       ARNOLD      ARNOLD
MORENO      MORENO      MORENO      BAKER       BAKER

Candidate numbers
assigned at random:           11000 DATA 3,5
ARNOLD   5                    11010 DATA 1, 5, 2, 4, 3, 0
BAKER    1                    11020 DATA 1, 2, 5, 4, 3, 0
MEYER    4                    11030 DATA 5, 1, 2, 4, 3, 0
MORENO   3                    11040 DATA 4, 3, 2, 5, 1, 0
PARK     2                    11050 DATA 3, 4, 2, 5, 1, 0
                              11060 DATA -1
```

(In a single-office election there is a method which is sometimes better than STV. A compromise candidate might be best, but might be everyone's second choice and be eliminated by STV as the trailing candidate on an early tally. To avoid that, for each pair of candidates A and B, count how many voters prefer A to B and vice-versa. If there is a candidate who wins all his one-on-one comparisons, that is the winner. If there is no such winner, use STV.)

I first encountered STV in the council elections for the department in which I work. People who do not want to serve cross their names off a list of those eligible, and the department votes by STV on those remaining. Rotation of membership is guaranteed by our rule that a person cannot serve two consecutive terms. The department has two major groups which get along well together, and even overlap, but have different interests. Our elections assure appropriate representation to each, without any need to designate them formally, or for some nominating committee to try to achieve a "balance." The balance is provided by the voters, through STV.

Figure 2.

```
QUOTA = 1260; 2 WINNERS: 1 5
HIGH = 1; LOWS = 3 4
TOTAL SURPLUS = 276; DIFFERENCE = 204
DISTRIBUTE EXCESS OF CANDIDATE 1

TALLY NUMBER 5

     1:    517      0      0    102    381
     2:    517      0      0    102    381
     3:    226      0      0     50    724
     4:      0      0      0   1000      0
     5:      0      0   1000      0      0
   SUM    1260      0   1000   1254   1486
   CAND      1      2      3      4      5
QUOTA = 1260; 2 WINNERS: 1 5
HIGH = 5; LOWS = 3 4
TOTAL SURPLUS = 226; DIFFERENCE = 254
ELIMINATE CANDIDATE 3

TALLY NUMBER 6

     1:    517      0      0    102    381
     2:    517      0      0    102    381
     3:    226      0      0     50    724
     4:      0      0      0   1000      0
     5:      0      0      0   1000      0
   SUM    1260      0      0   2254   1486
   CAND      1      2      3      4      5
QUOTA = 1260; 3 WINNERS: 1 4 5

  Program output:

  DISPLAY DETAILED TALLIES (Y/N)?Y
  BALLOTS
  1 :  1  5  2  4  3
  2 :  1  2  5  4  3
  3 :  5  1  2  4  3
  4 :  4  3  2  5  1
  5 :  3  4  2  5  1
```

```
 TALLY NUMBER 1

      1:   1000      0      0      0      0
      2:   1000      0      0      0      0
      3:      0      0      0      0   1000
      4:      0      0      0   1000      0
      5:      0      0   1000      0      0
    SUM    2000      0   1000   1000   1000
    CAND      1      2      3      4      5
QUOTA = 1260; 1 WINNERS: 1
HIGH = 1; LOWS = 2 3
TOTAL SURPLUS = 740; DIFFERENCE = 1000
ELIMINATE CANDIDATE 2
HIGH = 1; LOWS = 3 4
TOTAL SURPLUS = 740; DIFFERENCE = 0
DISTRIBUTE EXCESS OF CANDIDATE 1

TALLY NUMBER 3

      1:    630      0      0      0    370
      2:    630      0      0      0    370
      3:      0      0      0      0   1000
      4:      0      0      0   1000      0
      5:      0      0   1000      0      0
    SUM    1260      0   1000   1000   1740
    CAND      1      2      3      4      5
QUOTA = 1260; 2 WINNERS: 1 5
HIGH = 5; LOWS = 3 4
TOTAL SURPLUS = 480; DIFFERENCE = 0
DISTRIBUTE EXCESS OF CANDIDATE 5

TALLY NUMBER 4

      1:    630      0      0    102    268
      2:    630      0      0    102    268
      3:    276      0      0      0    724
      4:      0      0      0   1000      0
      5:      0      0   1000      0      0
    SUM    1536      0   1000   1204   1260
    CAND      1      2      3      4      5
```

Introducing "almost wholesale" prices:

16K RAM KITS......13.95

Set of 8 NEC 4116 200 ns. Guaranteed one full year.

DISKETTES

ALPHA DISKS................21.95

Single sided, certified Double Density 40 Tracks, with Hub-ring. Box of 10. Guaranteed one full year.

VERBATIM DATALIFE

MD 525-01, 10, 16	26.50
MD 550-01, 10, 16	44.50
MD 557-01, 10, 16	45.60
MD 577-01, 10, 16	34.80
FD 32 or 34-9000	36.00
FD 32 or 34-8000	45.60
FD 34-4001	48.60

DISKETTE STORAGE

5¼'' PLASTIC LIBRARY CASE	2.50
8'' PLASTIC LIBRARY CASE	3.50
PLASTIC STORAGE BINDER w/ Inserts	9.95
PROTECTOR 5¼'' (50 Disk Capacity)	21.95
PROTECTOR 8'' (50 Disk Capacity)	24.95
DISK BANK 5¼''	5.95
DISK BANK 8''	6.95

ALTOS, NEC, & HP COMPUTER SYSTEMS

Call Alpha Byte for our low prices.

ATARI COMPUTERS

ATARI 800	659.00
ATARI 400 (16K)	$CALL
ATARI 810 DISK DRIVE	445.00
ATARI 850 INTERFACE	169.00
ATARI 410 PROGRAM RECORDER	75.00
JOYSTICK CONTROLLER	10.00
PADDLE CONTROLLERS	19.95
STAR RAIDERS	35.00
MISSILE COMMAND	35.00
ASTERIODS	35.00
PACMAN	35.00

INTEC PERIPHERALS RAM MODULES

48K FOR ATARI 400	279.00
32K FOR ATARI 800	125.00

PRINTERS

C-ITOH F-10 40 CPS PARALLEL	1390.00
C-ITOH F-10 40 CPS SERIAL	1390.00
C-ITOH PROWRITER PARALLEL	480.00
C-ITOH PROWRITER SERIAL	590.00
EPSON MX-80 W/GRAFTRAX PLUS	$CALL
EPSON MX-80 F/T W/GRAFTRAX PLUS	$CALL
EPSON MX-100 W/GRAFTRAX PLUS	$CALL
EPSON GRAFTRAX PLUS	60.00
COMREX-CR1 PARALLEL	839.00
COMREX-CR1 SERIAL	859.00
IDS PRISM 80 W/COLOR	1599.00
IDS PRISM 132 W/COLOR	1799.00
NEC 8023A	485.00
NEC SPINWRITER 3530 P. RO	1995.00
NEC SPINWRITER 7710 S. RO	2545.00
NEC SPINWRITER 7730 P. RO	2545.00
OKIDATA MICROLINE 82A	469.00
OKIDATA MICROLINE 83A	720.00
OKIDATA MICROLINE 84	1199.00
OKIGRAPH 82	59.00
OKIGRAPH 83	59.00
GRAPH PROMS 82 & 83	79.00

APPLE HARDWARE

SUPER CLOCK II	129.00
VERSA WRITER DIGITIZER	259.00
ABT APPLE KEYPAD	119.00
SOFTCARD PREMIUM SYSTEM	579.00
MICROSOFT Z-80 SOFTCARD	260.00
MICROSOFT RAMCARD	125.00
VIDEX 80x24 VIDEO CARD	260.00
VIDEX KEYBOARD ENHANCER II	129.00
VIDEX ENHANCER REV 0-6	99.00
M & R SUPERTERM 80x24 VIDEO BD	315.00
APPLE COOLING FAN	44.95
T/G JOYSTICK	44.95
T/G PADDLE	29.95
T/G SELECT-A-PORT	54.95
VERSA E-Z PORT	21.95
MICRO SCI A40 W/CONTROLLER	479.00
MICRO SCI A70 W/CONTROLLER	629.00
PROMETHEUS VERSACARD	180.00
MICROBUFFER II‡ 16K W/GRAPHICS	259.00
MICROBUFFER II‡ 32K W/GRAPHICS	299.00
SUPERFAN II	62.00
RANA CONTROLLER	114.00
RANA DRIVES	360.00

IBM HARDWARE

SEATTLE 64K RAM +	370.00
QUADRAM QUADBOARD 64K	464.00
64K MEMORY UPGRADE	80.00

MONITORS

NEC 12'' GREEN MONITOR	174.00
NEC 12'' COLOR MONITOR	399.00
SANYO 12'' MONITOR (B & W)	249.00
SANYO 12'' MONITOR (GREEN)	269.00
SANYO 13'' COLOR MONITOR	469.00
AMDEK COLOR I	389.00
AMDEK RGB COLOR II	859.00
AMDEK RGB INTERFACE	169.00
COMREX 12'' GREEN MONITOR	159.00

MOUNTAIN HARDWARE

CPS MULTIFUNCTION BOARD	199.00
ROMWRITER	149.00
APPLE CLOCK	252.00
A/D + D/A	299.00
RAMPLUS 32K	149.00

CALIF. COMPUTER SYSTEMS

S-100 BOARDS

2200A MAINFRAME	459.00
2065C 64K DYNAMIC RAM	539.00
2422 FLOPPY DISK CONT. & CP/M®	359.00
2710 FOUR SERIAL I/O	279.00
2718 TWO SERIAL / TWO PARALLEL I/O	269.00
2720 FOUR PARALLEL I/O	199.00
2810 Z-80 CPU	259.00

APPLE BOARDS

7710A ASYNCHRONOUS S. INTERFACE	149.00
7712A SYNCHRONOUS S. INTERFACE	159.00
7424A CALENDAR CLOCK	99.00
7728A CENTRONICS INTERFACE	105.00

MODEMS

NOVATION CAT ACOUSTICS MODEM	135.00
NOVATION D-CAT DIRECT CONNECT	156.00
NOVATION AUTO-CAT AUTO ANS	219.00
NOVATION APPLE-CAT	310.00
HAYES MICROMODEM II (APPLE)	289.00
HAYES 100 MODEM (S-100)	325.00
HAYES SMART MODEM (300 BAUD)	227.00
HAYES SMART MODEM (1200 BAUD)	540.00
HAYES CHRONOGRAPH	199.00
LEXICON LEX-11 MODEM	109.00

TERMINALS

TELEVIDEO 910	639.00
TELEVIDEO 912C	745.00
TELEVIDEO 920C	830.00
TELEVIDEO 950C	995.00
ADDS-VIEWPOINT	599.00

TRS-80 HARDWARE

PERCOM DATA SEPARATOR	27.00
PERCOM DOUBLER II	159.00
TANDON 80 TRK DISC DRIVE W/ P/S	345.00
TANDON 40 TRK DISK DRIVE W/ P/S	289.00
LNW DOUBLER W/DOSPLUS 3.3	138.00
LNW 5/8 W/ DOSPLUS 3.4	171.00
MOD III DRIVE KIT	615.00

MORROW DESIGNS

FLOPPY DISK SYSTEMS

Controller, P.S., Microsoft Basic, CP/M®, A & T.

DISCUS 2D (Single Drive — 500K)	1075.00
DISCUS 2D (Dual Drive — 1MEG)	1695.00
DISCUS 2 + 2 (Single Drive — 1MEG)	1777.00
DISCUS 2 + 2 (Dual Drive — 2 MEG)	2317.00

Save 31%

FRANKLIN ACE 1000	**1595.00**
RANA DISK DRIVE	**449.00**
RANA DRIVE CONT. CARD	**135.00**
EPSON MX-80 F/T PRINTER	**695.00**
MICROBUFFER 32K	**299.00**
NEC 12" GREEN MONITOR	**200.00**
VERBATIM DISKS	**45.00**
LIBRARY CASE	**5.00**

~~$3423~~

Now $2352

HARD DISK SYSTEMS

Controller, P.S., Microsoft Basic, CP/M®, A & T.

DISCUS M10 (10 Megabytes)	3345.00
DISCUS M26 (26 Megabytes)	4045.00

BARE DRIVES

TANDON 5¼ INCH

100-1 SINGLE HEAD 40 TRK	195.00
100-2 DUAL HEAD 40 TRK	275.00
100-3 SINGLE HEAD 80 TRK	250.00
100-4 DUAL HEAD 80 TRK	369.00

TANDON THINLINE 8 INCH

848-1 SINGLE SIDE	379.00
848-2 DUAL SIDE	490.00

MICRO PRO

APPLE CP/M®

WORDSTAR*†	199.00
SUPERSORT*†	109.00
MAILMERGE*†	69.00
DATASTAR*†	162.00
SPELLSTAR*†	109.00
CALCSTAR*†	109.00

MICROSOFT

APPLE

BASIC COMPILER*	296.00
Z-80 SOFTCARD	260.00
RAMCARD	125.00
OLYMPIC DECATHLON	24.95
TASC APPLESOFT COMPILER	126.00

CP/M®

BASIC 80	249.00
BASIC COMPILER	299.00
FORTRAN 80	359.00

APPLE SOFTWARE

MAGIC WINDOW	79.00
BASIC MAILER	59.00
DB MASTER	169.00
DB MASTER UTILITY PACK	69.00
PFS: GRAPH	89.95
PFS: (NEW) PERSONAL FILING SYSTEM	85.00
PFS: REPORT	79.00
Z-TERM PRO*	129.95
EASY WRITER-PRO	199.00
EASY MAILER-PRO	79.00
EXPEDITER II APPLESOFT COMPILER	73.95
LISA 2.5	59.95

CONTINENTAL SOFTWARE

G/L	199.00
A/R	199.00
A/P	199.00
PAYROLL	199.00
PROPERTY MGMT	399.00
THE HOME ACCOUNTANT	59.95

VISICORP

DESKTOP PLAN II	189.00
VISIPLOT	158.00
VISITREND/VISIPLOT	229.00
VISIDEX	189.00
VISITERM	79.00
VISICALC	189.00
VISIFILES	189.00

CP/M® SOFTWARE

THE WORD-SPELL CHECK	69.00
d BASE II	429.00
SUPER CALC	189.00
P & T CP/M® MOD II TRS-80	175.00
COMMX TERMINAL PROG	82.50
SYSTEM PLUS- G/L,A/R,A/P,P/R	1799.00

IBM SOFTWARE

VOLKSWRITER	145.00
WRITE ON	90.00
EASYWRITER II	247.00
HOME ACCOUNTANT	159.00
VISICALC / 256K	189.00
WORDSTAR	285.00
MAILMERGE	79.00

Call for additional software.

IBM GAMES

DEADLINE	35.00
ZORK I OR ZORK II	28.00

TRS-80 SOFTWARE

NEWDOS/80 2.0 MOD I,III	139.00
LAZY WRITER MOD I,II	165.00
PROSOFT NEWSCRIPT MOD I,III	99.00
OMNITERM SMART TERM MOD I,III	89.95
MICROSOFT BASIC COMP. FOR MOD I	165.00
LDOS 5.1 MOD I,III	119.00
DOSPLUS 3.4	89.00

APPLE GAMES.

Call for games not listed.

BRODERBUND

APPLE PANIC	23.61
MIDNIGHT MAGIC	27.26

AUTOMATED SIMULATIONS

TEMPLE OF APSHAI	31.35
HELLFIRE WARRIOR	31.35
STAR WARRIOR	31.35
RESCUE AT RIGEL	23.36
CRUSH,CRUMBLE AND CHOMP	23.36

MUSE SOFTWARE

ROBOT WARS	32.95
THREE MILE ISLAND	31.61
A.B.M.	19.46
GLOBAL WAR	20.95
CASTLE WOLFENSTEIN	23.36

ON-LINE SYSTEMS

WIZARD AND PRINCES	27.26
MISSILE DEFENSE	27.26
SOFT PORN ADVENTURE	23.36
THRESHOLD	31.16
JAW BREAKER	23.36
TIME ZONE	77.96
H/R CRIBBAGE	20.95
PEGASUS II	23.36

SIRIUS SOFTWARE

SPACE EGGS	23.36
GORGON	31.16
SNEAKERS	23.36
EPOCK	27.26
BEER RUN	23.36
HADRON	29.95
PULSAR II	23.36

EDU-WARE

COMPU-READ	24.95
COMPU-MATH: ARITHMETIC	39.95

MORE GREAT APPLE GAMES

COMPUTER QUARTERBACK	31.16
THE SHATTERED ALLIANCE	49.95
POOL 1.5	27.26
ULTIMA	31.16
RASTER BLASTER	23.36
FLIGHT SIMULATOR	26.61
SARGON II	28.95
SNACK ATTACK	23.36
ROACH HOTEL	27.26
THE WARP FACTOR	31.16
COSMO MISSION	23.36
WIZARDRY	37.95
ZORK I OR ZORK II	28.00

SUPPLIES

AVERY TABULABLES

1.000 3½ x 15/16	8.49
3.000 3½ x 15/16	14.95
5.000 3½ x 15/16	19.95

FAN FOLD PAPER

(Prices F.O.B. S.P.)

9½ x 11 18lb WHITE 3.000 ct	29.00
14 7/8 x 11 18lb WHITE 3.000 ct	39.00

Alpha Byte COMPUTER PRODUCTS

To order or for information call (213) 706-0333

Modem order line: (213) 883-8976

We guarantee everything we sell for 30 days — no returns after 30 days. Defective software will be replaced free, but all other software returns are subject to 15% restocking fee and must be accompanied by RMA slip. No returns on game software, unless defective.

We accept VISA and MasterCard on all orders, COD orders, up to $300.

Shipping charges: $3 for all prepaid orders, actual shipping charges for non-prepaids; $3 for COD orders under 25lbs. ($6 for over) plus a $4 surcharge; add 15% for foreign, FPO and APO orders. Calif. add 6% sales tax, L.A. County add 6½%.

Prices quoted are for stock on hand and are subject to change without notice.

31245 LA BAYA DRIVE, WESTLAKE VILLAGE, CALIFORNIA 91362

CIRCLE 105 ON READER SERVICE CARD

CP/M is a reg. trademark of Digital Research *Requires Z-80 Softcard †Reg. trademark of Micro Pro International Corp ‡Trademark of Practical Peripherals, Inc

Figure 3a.

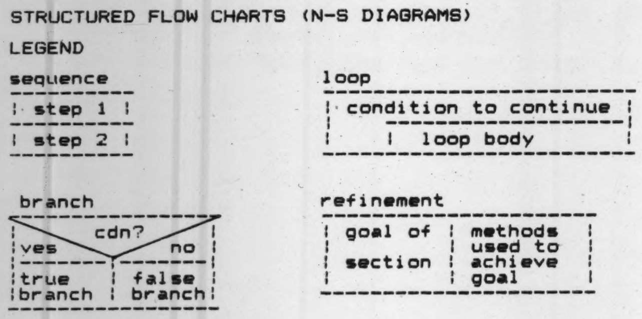
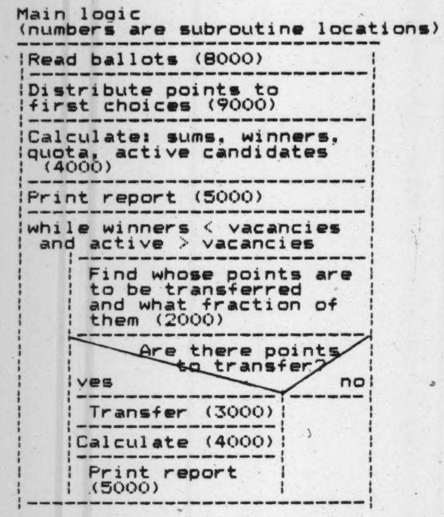

STRUCTURED FLOW CHARTS (N-S DIAGRAMS)
LEGEND
sequence
step 1
step 2
loop
condition to continue
loop body
branch
cdn?
yes
no
true branch
false branch
refinement
goal of section
methods used to achieve goal

Figure 3b.


Main logic
(numbers are subroutine locations)
Read ballots (8000)
Distribute points to first choices (9000)
Calculate: sums, winners, quota, active candidates (4000)
Print report (5000)
while winners < vacancies and active > vacancies
Find whose points are to be transferred and what fraction of them (2000)
Are there points to transfer?
yes
no
Transfer (3000)
Calculate (4000)
Print report (5000)

Conducting an Election

Various sets of rules for carrying out the tallies are in use, and could conceivably give different results in some elections so it is important to adopt explicit rules before the election to avoid arguments afterward. One way would be to adopt the rules contained in the attached program. A copy of some rules for manual counting is available from the city of Cambridge, MA (2).

Every group that might want representation should have one or more candidates running. STV imposes no penalty on a group for nominating more candidates than it can elect. The votes of their losing candidates will be transferred to their stronger ones. You might want to allow as candidates everyone who has a certain number of petition signatures; everyone whose name is proposed and who does not decline; or even everyone eligible who has not declined.

Each voter ranks the candidates according to his preference, for instance by taking a list of the candidates' names and marking beside each name its rank: 1 beside the favorite, 2 beside the second choice, and so on (Figure 1). Ranking only the first few choices indicates no preference among the unranked candidates. If a voter's object is to make sure that Whyte doesn't get elected, then he must rank all other candidates, ranking Whyte last or not at all.

You will have to decide what to do about various kinds of irregular ballots. For instance, if someone ranks candidates as 1, 3, and 4, but doesn't use 2, you might decide his 3 really meant 2 and his 4 was a 3. If he had numbers 1, 2, 2, 3, you could decide at random which is 2 and which is 3, and make the 3 a 4. Such decisions should be known to the voters before the election.

Suppose you adopt the attached program as your counting rule. The program identifies each candidate by a number from 1 to the number of candidates. Assign candidate numbers in a random order, to randomize the tie-breaking process in the program.

The first data statement has the number of positions to be filled and the number of candidates. Each succeeding data statement represents a ballot, assigning to each candidate numbers based on the preference order of that ballot, and ending with a zero. The last data statement contains the number -1, to signal the end of the data.

Check the array dimensions. The first dimension of BALLOT is the number of ballots, the second at least one more than the number of candidates. Dimensions of SUM and Z are the number of candidates. The dimensions of TALLY are the number of ballots and the number of candidates.

The output shows what you need to know to tell why the program decided to make the transfers it did. If you requested detailed tallies, then you also get a table for each tally showing how many points of each ballot have been given to each candidate. Sums are done in real precision, but the table is printed out rounded off, so the sums may sometimes appear to be off by one or two points. If points of a ballot are to be transferred from candidate X but the ballot indicates no further choices after X, then those points become invalid, and are given to a fictitious "candidate 0." Invalid points no longer count in the election, so the number of points required to win (the "quota") becomes smaller.

The Sample Election

There are five candidates to fill three positions, and five voters. Their ballots are shown in Figure 1. DATA statement 11010 represents the first ballot, and shows that its first choice is candidate number one, Baker; second choice is number 5, Arnold; third is number two, Park; and the last two choices are numbers four and three, Meyer and Moreno.

The second tally is not displayed; it is identical to the first, since candidate number 2 had no points to transfer. From the final tally (Figure 2), we see that the winners are candidates 1, 4, and 5: Baker, Meyer and Arnold. The 60% majority (the first three ballots) got 67% of the seats, and the 40% minority got 33%; even though the minority "split their vote" between Meyer and Moreno.

Program Details

The attached program should run as is, or with the variable names abbreviated, on just about any version of Basic with floating-point arithmetic and two-subscript arrays. You can probably tune it up to be more efficient using features of your particular Basic. On a 48K Apple II Plus it runs as is for about 200 ballots for ten candidates or 300 ballots for six candidates, in about six to eight minutes for random ballots.

The program saves time by not transferring surplus points unless the total

GET FREE SOFTWARE FOR YOUR COMPUTER!

HOW? JUST ORDER ANY OF THE ITEMS BELOW, AND SELECT YOUR FREE SOFTWARE FROM THE BONUS SOFTWARE SECTION, USING THE FOLLOWING RULE: FOR THE FIRST $100.00 WORTH OF MERCHANDISE ORDERED TAKE 1 ITEM; FOR THE NEXT $200.00 WORTH OF MERCHANDISE ORDERED TAKE ANOTHER ITEM; FOR THE NEXT $300.00 TAKE A THIRD ITEM, ETC. ALL AT NO COST.

HARDWARE by APPLE COMPUTER & FRANKLIN:

APPLE II + 48K	1199	PASCAL DISK + BKS	200
FLOPPY DR + CNTRLR	545	FLOPPY DRIVE	465
APPLE III 128K	2999	PILOT	125

We carry the rest of the APPLE and FRANKLIN line at low, low prices' CALL'

OTHER HARDWARE for APPLE/FRANKLIN:

D.C. HAYES:

Micromodem II	285	Smartmodem	225
		Smartmodem 1200	CALL

MICROSOFT:

Z80 Softcard	269	16K Ramcard	119

MOUNTAIN COMPUTER:

Expansion Chassis	559	Music System	339
A/D + D/A Card	289	CPS Multi-function	169
X/10 Control Card	169	Super Talker	169

CALL FOR MORE PRICES' WE CARRY FULL LINE'

CALIFORNIA COMPUTER SYSTEMS:

Centronics Par Int	115	Async Serial Int	135

CALL FOR MORE PRICES' WE CARRY FULL LINE'

VIDEX:

80 Col Bd & Softswitch	245	Enhancer II	125
Enhancer I	105	Softswitch	29

MORE OTHER HARDWARE FOR APPLE/FRANKLIN:

SSM AIO-II	195	Keybd Co Num Keypad	129
SSM Serial ASIO	115	Sunshine Joystick	39
SSM Par APIO	99	Game Paddles	29
Novation Apple Cat	319	Shadow Vet	675
Versawriter Tablet	249	SUP R MOD	29
Prac Periph Microbuff (32K)	249	Prac Periph Microbuff (16K)	225

OTHER SOFTWARE for APPLE/FRANKLIN:

PERSONAL SOFTWARE/VISICORP:

Visicalc 3 3	195	Visifiles	199

CALL FOR MORE PRICES' WE CARRY FULL LINE'

MICROSOFT:

APPLE Fortran (Z80)	129	APPLE Cobol (Z80)	499
TASC Basic Compiler	139	MBASIC Compiler (Z80)	299
TIME Manager	125	MuMath	199
ALDS	99	M SORT	149

MICRO-PRO:

Wordstar	225	Mail-Merge	99
Spellstar	149	Data-Star	199
Super-Sort	149	Calc-Star	149

PEACHTREE: BIZ Packages, all CALL

SYSTEMS PLUS: BIZ Packages, all CALL

MORE OTHER SOFTWARE for APPLE/FRANKLIN:

DB Master	179	DB Master for CORVUS	399
ASCII Express	55	PFS	85
Sorcim Super Calc	189	Dakin 5 BIZ Bookkeeper	299
Howard Tax Prep	115	Broderbund Payroll	325
Howard Real Estate Anal	129	BPI Accounting Pkgs ea	325

WORD-PROCESSORS & SPELLERS for APPLE:

Wordstar CP/M	225	EZWriter Prof Sys	149
Magic Wand CP/M	299	MUSE Super Text 80	150
Executive Secretary	199	Wordpower	50
Letter Perfect	125	Hebrew II	55
Magic Window	85	Screenwriter II	110
Spellguard	219	Spellstar CP/M	149
Word Handler (Gives 80-Col & Lower-Case with no board')			199

PRINTERS

EPSON:

MX80	499	MX80 F/T	549
MX100 w/Graftrax	729	MX80 Ribbon	15
APPLE Intfce/Cbl	85	GRAFTRAX	60
GRAPPLER Intfc	149	MX100 Ribbon	24

C.ITOH:

F-10 Daisy Wheel (Par)	1495	F-10 Daisy Wheel (Ser)	1495
Pro-Writer (Par/Ser)	599	Pro-Writer (Par)	499
F-10 Tractor Option	225	Printer Interfaces	CALL

NEC:

PC-8023A	495	NEC 7710 Daisy	2345

QUME:		**DIABLO:**	
SPRINT 9/45	1995	630 R/O	2099

OKIDATA:

Microline 82A	475	Microline 80	375
Microline Tractor	59	Okigraph I	79
Microline 83A	799	Microline 84 (Par)	1099

IDS:

560 with graphics	1095	Prism-Print Software	49
Prism 80 (Basic)	899	Prism 132 (Basic)	1050
Auto Sheet Feed	125	Prism Color	325
Sprint Mode (200 cps)	125	Dot Plot Graphics	85
SMITH CORONA:	689	**BROTHER HR-1**	CALL

ADD-ON MEMORY CARDS & DISK DRIVES FOR APPLE

MEMORY:

Microsoft 16K Ramcard	139	Saturn 32K Card	199
Legend 128K Ramcard	649	Saturn 64K Card	369
Legend 64K Ramcard	299	Saturn 128K Card	525
SVA 256K APL-Cache	1045	Prometheus 128K	439
AXLON 320K Ram Disk	1149	16K of 4116 200 NS Mem	25

APPLE-COMPATIBLE FLOPPIES by MICRO-SCI:

With Controller		No Controller	
A35 Exact Replacement	460	A35 Exact Replacement	415
A40 40-Track	489	A40 40-Track	399
A70 70-Track	599	A70 70-Track	499

8 FLOPPY DISK SYSTEMS:

SVA AMS8000 Dual SSDD	1945	SVA AMS8000 Dual DSDD	2595
SVA ZVX4 Quad Cntrllr	495	SVA Disk 2 + 2 Cntrllr	359

CORVUS HARD DISKS:

6 MB Hard Disk	2249	Apple Interface	175
11 MB Hard Disk	3945	Other Computer Intfce	CALL
20 MB Hard Disk	4769	Mirror Back-Up	675

MONITORS, PLOTTERS & PERIPHERALS

MONITORS:

Zenith 12" Green	125	Zenith 13" Color	359
Amdek 12" Green (300G)	175	Amdek 13" Color	359
BMC 12" Green	119	BMC 12" Color	349

PLOTTERS:

Watanabe 4-Pen	1150	Watanabe 6-Pen	1400
Strobe Plotter 1-Pen	699	Strobel Apple Intfce	99
Houston Inst DMP-3	929	Houston Inst DMP-4	1185

FLOPPY DISKS

Elephant 5 25"		Elephant 8"	
Soft SSSD/bx	25	Soft SSSD/6xr	29
3M 5" Soft SSD/bx	27	3M 8" Soft SSSD/bx	32
Maxwell 5" Soft SSSD/bx	31	Maxwell 8" Soft SSSD/bx	35
DYSAN 5" Soft SSSD/bx	37	DYSAN 8" Soft SSSD/bx	49

COMPUTER SYSTEMS

ATARI

ATARI 800 (16K)	629	PAC-MAN	33
810 Disk Drive	449	ATARI 410	79
16K Ram Memory	89	825 Printer	575
Microsoft Basic	69	850 Interface	169
INTEC 32K Ram Memory	129	ATARI 800 (48K)	739
OSBORNE 1	1695	***KAYCOMP II**	1699

XEROX

Full Line at Rock Bottom Prices CALL'

NEC

Full Line at Low Low Prices' CALL'

HEWLETT-PACKARD

Entire Line at Hugh Discounts' CALL'

HARDWARE FOR IBM PC

AMDEK Color II Monitor	769
BABY BLUE Run CP/M'	549
CORVUS Hard Disks	See CORVUS Section this page
CORVUS/IBM PC Intfce	239
MICROSOFT 64K RAM cd	395
MICROSOFT 128K RAM cd	555
MICROSOFT 256K RAM cd	875
QUADRAM 256K 4-Function Card	699
PERCOM Drives	CALL
TECMAR We carry complete line'	CALL
TANDON 5 25" Floppy Drive SD	249
TANDON 5 25" Floppy Drive DD	329
SEATTLE RAM & RS232 Port	CALL

SOFTWARE FOR IBM

ASHTON-TATE dBASE II	CALL
CONTINENTAL Home Accountant	125
INSOFT Accountant per Module	99
INFO UNLTD Easy Writer II	259
MICROPRO Wordstar	285
SORCIM Supercalc	219
VISICORP Visical C 256K	195
VISICORP Visifile	249
VISICORP Visitrend Plot	249
VISICORP Desktop Plan	249

GENERAL CP/M SOFTWARE

MICROSOFT:

Basic 80	275	Edit 80	139
Basic Compiler	299	Mu Math Mu Simp	199
Fortran 80	339	Mu Lisp Mu Star	159
Cobol 80	499	M-Sort	128
Macro 80	139	Multi Plan	CALL

MICROPRO:

Wordstar	275	Calcstar	199
Mailmerge	89	Supersort	165
Spellstar	165	Custom Notes	275
Datastar	239		

ASHTON-TATE:

dBASE II	475	dBASE II Guide	29

SORCIM:

Super Calc	189

FOX-GELLER:

Quickscreen	129	dUTIL	69
Quickcode (Writes programs for dBASE II)			199

BONUS SOFTWARE SECTION!

SUPER MESSAGE: Creates colorful, dynamic on-screen messages in full page "chunks" Each message allows statements of mixed typestyles, typesizes and colors, in mixed upper and lower case Styles range from regular APPLE characters, up to double-size, double-width characters with heavy, bold font Six colors may be used for each different typestyle Vertical and horizontal centering are available, and word-wrap is automatic Users can chain pages together to make multi-page messages Pages can be advanced manually or automatically. Multi-page messages can be stored to disc or recalled instantly $50

APPLE DATA GRAPH 2.1: Plots up to 3 super imposed curves on the Hi-res Screen both X & Y axes dimensioned. Each curve consists of up to 120 pieces of data Graphs can be stored to disc and recalled immediately for updating Great for Stock-market Charting, Business Management, and Classroom instruction! $35

APPLE RECORD MANAGER: Allows records within any file to contain up to 20 fields, with user-defined headings Information can be string or numeric Users can browse thru files using page-forward, page-backward or random-search commands Records can easily be searched, altered or sorted at will Works with 1 or 2 drives Records or Files can be printed, if desired $40

APPLE LITERATURE INDEX: Allows rapid retrieval (via keywords) of references from total APPLE literature thru June 1981, on 5 25" disc Each entry in the Index consists of the article, author-name, periodical-name, date of issue, & page nos The Index is intended to support large magazine files which would require lengthy manual searching to recover information. Annual updates will be available $60

WORDPOWER: Is a simple, powerful, low cost, line-oriented word processor program It offers a fast machine language FIND & REPLACE Text can be listed to screen or printer Lower-case adaptors are supported You can merge files, move group of lines, and easily add, change, or delete lines Good for business or personal use $50

LABELMAKER: Allows a given label to be generated in any quantity from 1 to 32767 The program generates labels not only for addresses, but also for price-tags, part numbers, and mail-messages such as "RUSH", "FRAGILE" etc A self-incrementing feature allows theatre-tickets to be produced, with a date, and numbers running from a000 to z999 An editor is provided for editing labels prior to printing All labels may be saved to disc for instant recall $35

APPLE INVOICER: Allows entry of price, quantity, & description of items Automatically calculates horizontal & vertical totals, figures in sales tax, & special handling Then it generates required number of invoice copies Good for people who need arithmetic done automatically! $50

MAIL SUPREMACY: A quick 'n' easy mail list package Allows a fifth line for foreign country or customer code Searches & sorts rapidly Works with 1 drive $30

APPLE FUNNYWORD: A party amusement! Creates endless artificial comical words on screen or printer! Examples IDAHEN! UPOTIJI! VUTOHEG! BEJATAV! OKYWEXU! GOPAGA! Good fun for feeble-minded! $20

Above software for APPLE DOS 3.3 only. Call for BONUSES for other systems.

TO ORDER: Use phone or mail. We accept VISA, MC, COD's, personal checks & money orders. Add 4% for credit card. Customer pays handling on COD orders. Foreign orders must be in U.S. Dollars & include 10% for handling. Conn. residents add 7.5% sales tax.

*Not available thru mail-order.

CONN. INFO. SYSTEMS CO.
(203) 579-0472
218 Huntington Road, Bridgeport, CT 06608

Not responsible for typographical errors Prices subject to change without notice

CIRCLE 153 ON READER SERVICE CARD

COTTAGE SOFTWARE

PACKER: Machine language program that edits all or part of your Basic program to run faster, save memory, or ease editing. The 5 options include UNPACK—unpacks multiple statement lines into single statements maintaining logic inserts spaces and renumbers lines. SHORT—deletes unnecessary words, spaces, and REM statements. PACK—packs lines into maximum multiple statement lines, maintaining program logic. RENUM—renumbers lines, including all branches. MOVE—moves line or blocks of lines to any new location in program. On 2 cassettes for 16K, 32K, & 48K. For TRS-80™ Mod I or III Level II or Disk Basic............$29.95

SYSTEM TAPE DUPLICATOR: Copy your SYSTEM format tapes. Includes verify routines. The Model III version allows use of both 500 and 1500 baud cassette speeds.
For TRS-80™ Model I or III Level II..........$15.95

CASSETTE LABEL MAKER: A mini word processor to print cassette labels on a line printer. Includes 50 peel-and-stick labels on tractor feed paper.
For TRS-80™ Model I or III Level II & Printer .$17.95

PRINT TO LPRINT TO PRINT: Edits your Basic program in seconds to change all Prints to LPrints (except Print@ or Print#) or LPrints to Prints. Save edited version.
For TRS-80™ Model I or III Level II..........$12.95

FAST SORTING ROUTINES: For use with Radio Shack's Accounts Receivable, Inventory Control I, and Disk Mailing List Systems for Model I Level II. Sorts in SECONDS! You'll be amazed at the time they can save. Supplied on data diskette with complete instructions.
FAST SORT for Accounts Receivable......$19.95
FAST SORT for Inventory Control I........$19.95
FAST SORT for Disk Mailing List (specify data diskette cassette for 1 drive system)..............$14.95
ALL THREE ROUTINES...................$44.95

Prices subject to change without notice. Call or write for complete catalog. Dealer inquiries invited. VISA and MasterCard accepted. Foreign orders in US currency only. Kansas residents add 3% sales tax.
On-line catalog on Wichita FORUM-80: 316-682-2113
Or call our 24 hour phone 316-683-4811 or write:

COTTAGE SOFTWARE
614 N. Harding Wichita, KS 67208

TRS-80 is a trademark of Tandy Corporation

CIRCLE 157 ON READER SERVICE CARD

SRA Educational Courseware: "Because learning matters"

Computer Drill and Instruction: Mathematics (Grades 1-6)
For your Apple* and Atari* personal computers.

An outstanding program of drill and instruction in basic arithmetic skills. Can provide student placement, monitor progress, keep performance records, and generate seatwork at each learner's own level of skill.

Level A—Grades 1 and 2, $365.00
Level B—Grades 3 and 4, 495.00
Level C—Grades 5 and 6, 575.00
Levels A-C, Complete, 1195.00

Each level includes Binder with Lesson Diskettes and Teacher's Guide, plus Manager's Pack with Teacher and Student Diskettes. *Registered trademarks.

☐ Yes! I want CDI: Mathematics! Please contact me immediately.
☐ Send me literature.

Name
School
Address
City, State, Zip
Telephone

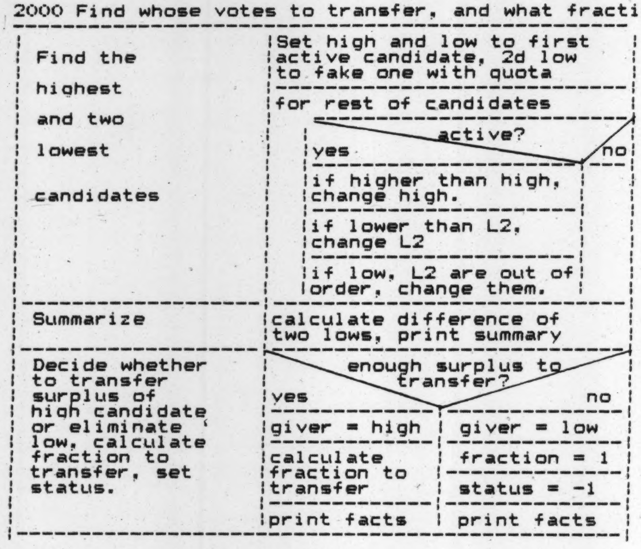
For faster service, call SRA toll-free: (800) 621-0476

SRA®
SCIENCE RESEARCH ASSOCIATES, INC.
155 N. Wacker Drive, Chicago, IL 60606

CIRCLE 288 ON READER SERVICE CARD

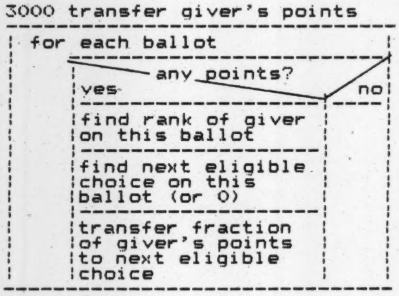
Every Vote, continued...

Figure 3c.



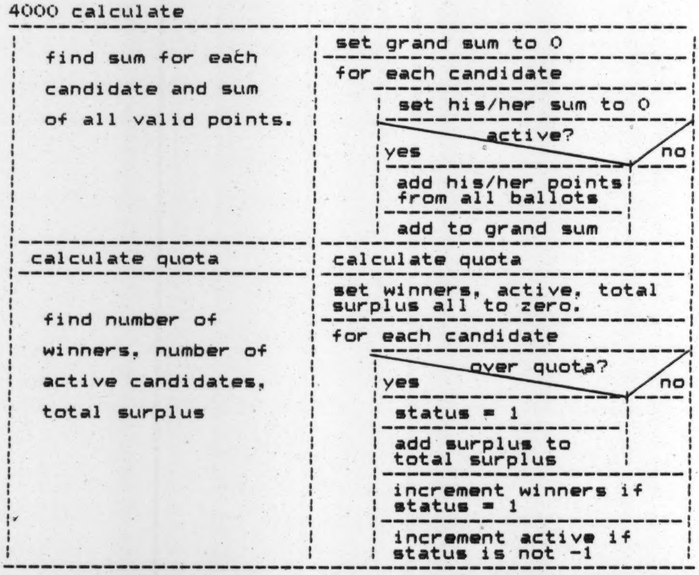
```
2000 Find whose votes to transfer, and what fraction of them.
Find the highest and two lowest candidates
    Set high and low to first active candidate, 2d low to fake one with quota
    for rest of candidates
        active?
            yes
                if higher than high, change high.
                if lower than L2, change L2
                if low, L2 are out of order, change them.
            no
Summarize
    calculate difference of two lows, print summary
Decide whether to transfer surplus of high candidate or eliminate low, calculate fraction to transfer, set status.
    enough surplus to transfer?
        yes
            giver = high
            calculate fraction to transfer
            print facts
        no
            giver = low
            fraction = 1
            status = -1
            print facts
```

Figure 3d.



```
3000 transfer giver's points
for each ballot
    any points?
        yes
            find rank of giver on this ballot
            find next eligible choice on this ballot (or 0)
            transfer fraction of giver's points to next eligible choice
        no
```

Figure 3e.



```
4000 calculate
find sum for each candidate and sum of all valid points.
    set grand sum to 0
    for each candidate
        set his/her sum to 0
        active?
            yes
                add his/her points from all ballots
                add to grand sum
            no
calculate quota
    calculate quota
find number of winners, number of active candidates, total surplus
    set winners, active, total surplus all to zero.
    for each candidate
        over quota?
            yes
                status = 1
                add surplus to total surplus
            no
        increment winners if status = 1
        increment active if status is not -1
```

TRS-80® COMPUTERS

CONSUMER DISCOUNT PRICES

BUY DIRECT

PURE RADIO SHACK EQUIPMENT

LOW DISCOUNT PRICES

BUY DIRECT SAVE MONEY

MICRO MANAGEMENT SYSTEMS, INC.

TRS-80 Color Computer PRICED FROM BUY DIRECT **$289**	**Smith Corona TP-1 Daisy Wheel Printer** PRICED FROM BUY DIRECT **$599**	**TRS-80 Model II Computer** PRICED FROM BUY DIRECT **$2988**
BUY DIRECT SAVE **TRS-80 Model III Computer** PRICED FROM BUY DIRECT **$599**	**NEW!** Radio Shack TRS-80 HARD DRIVES For Model I & III Call For Prices	**TRS-80 Model 16 Computer** PRICED FROM BUY DIRECT **$4158**

CALL US TOLL FREE FOR YOUR DISCOUNT PRICES!

WRITE FOR FREE CATALOG

ATARI

TRS-80
PERSONAL COMPUTERS
PRINTERS
SOFTWARE
Smith-Corona®
DAISY WHEEL

SONY®

FRANKLIN

CENTRONICS®

commodore COMPUTER

MICRO MANAGEMENT SYSTEMS, INC.

PARCEL DIVISION - DEPT. NO. 3
2803 Thomasville Road East • Cairo, Georgia 31728
GA. & INFO 912-377-7120

All **TRS-80** Equipment is Pure Radio Shack Factory Built. Free copy of Radio Shack Warranty available upon request. TM - Tandy Corporation

ORDER TOLL FREE 1-800-841-0860

CIRCLE 217 ON READER SERVICE CARD

TRS-80® by Radio Shack
Model 16 2 Drive
128K
Save over $1000.
Also available new TRS-80 DMP-200, DMP-400, DWP-410 and DMP-500.
IN STOCK
Call For Prices

Price — We have the best price. Check the others, but call us.
Selection — ATARI • APPLE • TRS-80 • EPSON • OKIDATA • C. ITOH, etc.
Service — Most items in stock for immediate shipment. Call or write for Free 40 page catalog of over 600 items.

Computer Discount of America
15 Marshall Hill Road
West Milford Mall
West Milford, NJ
07480-2198
In New Jersey call
201-728-8080
CALL TOLL FREE: 800-526-5313

CIRCLE 143 ON READER SERVICE CARD

Verbatim
flexible disks

Call Free **(800) 235-4137** for prices and information. Dealer inquiries invited. C.O.D. and charge cards accepted.

VISA

PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401. In Cal. call
(800) 592-5935 or
(805) 543-1037.

CIRCLE 240 ON READER SERVICE CARD

ATARI®

Entertainer Kit	88.00	Atari 800 16K	735.00
Programmer Kit	56.00	Atari 400 16K	359.00
Communicator Kit	345.00	Atari 410 Cassette	80.00
Microsoft Basic	72.00	Atari 810 Disk	480.00

ALL ATARI SOFTWARE 20% OFF
Plus Loads of 3rd Party Software!
VOTRAX TYPE'N'TALK: 340.00
ALSO **EPSON & CENTRONICS PRINTERS**
ZENITH & TELEVIDEO TERMINALS

BBI Mail Order is a company made up of computer professionals. We are able to provide low prices as well as technical support. Give us a call and find out why we consider the Atari the best home computer on the market today. You won't be disapointed.

BBI Mail Order
Specializing in Atari Home Computers
P.O. Box 365
Newton Highlands, MA 02161
(617) 964-3080

CIRCLE 120 ON READER SERVICE CARD

Dictionary Of Variables

AMOUNT: Amount of this candidate's vote to be transferred.
BLTNO: Number of this ballot.
B9: Total number of ballots.
BALLOT (BLTNO,RANK): Number of candidate ranked RANK on ballot number BLTNO.
CNDNO: Number of this candidate.
C9: Total number of candidates.
C8: Number of candidates not eliminated.
DFF: Difference between sums of two lowest candidates.
D$: Detail flag: "Y" means print details of tallies.
FRACT: Fraction of GIVER's vote to be transferred.
GIVER: Number of candidate whose votes are to be transferred.
HIGH: Number of candidate with highest sum.
ITER: Iteration number (tally number).
KOLUMS: Column width for print subroutine.
K2: Counter for print subroutine.
LOW: Number of candidate with lowest sum.
L2: Number of candidate with second lowest sum.
QUOTA: Quota.
RANK: Position on someone's ballot.
SUM: Total of all valid points.
SUM (CNDNDO): Total points for candidate number CNDNO.
S2: Total surplus of winners.
TALLY (BLTNO, CNDNO): Number of points of ballot BLTNO being counted for candidate number CNDNO.
VACANCIES: Number of positions to be filled by the election.
WINNERS: Number of candidates already declared winner.
X: Value to be printed by subroutine.
Z (CNDNO): "Ztatus" of candidate number CNDNO:
-1 eliminated
0 still eligible, not elected
1 elected

Listing 1.

```
100  REM  SINGLE TRANSFERABLE
110  REM      VOTE
120  REM  COUNTING PROGRAM
130  REM  J T PARR  MAY 1982
140  REM  PERMISSION TO USE,
150  REM  NOT SELL.
160  REM  REFERENCE:
170  REM   HOW DEMOCRACIES VOTE
180  REM   BY ENID LAKEMAN,
190  REM   FABER & FABER
192  REM   LONDON 1974
195  REM ----------------------
210  REM  ALL VARIABLES MAY BE
211  REM  SHORTENED TO FIRST
212  REM  LETTER OR LETTER
213  REM  AND DIGIT.
290  REM ----------------------
500  DIM BALLOT(31,14)
510  DIM SUM(14)
520  DIM TALLY(31,13)
540  DIM Z(13)
550  LET KOLUMS = 5
1000  REM --------------------
1010  REM   C O N T R O L
1020  REM --------------------
1050  PRINT "DISPLAY DETAILED TALLIES (Y/N)";
1060  INPUT D$
1100  REM   R E A D   V O T E S
1110  GOSUB 8000
1150  REM   1 S T  C H O I C E S
```

800-SOFTWARE

WORDSTAR™ $249 For IBM/PC

dBASE II™ $495

SuperCalc™ $199

Perfect Writer™ $249

CHECK OUT ALL OUR INCREDIBLE BUSINESS CP/M ® PRICES.

MICROPRO™	For Apple	For CP/M
*WordStar	$199	$249
Wordstar/MailMerge	$259	$309
*MailMerge	$ 69	$ 79
CalcStar	$119	$199
DataStar	$169	$199
SpellStar	$119	$169
Supersort	$119	$169

PERFECT SOFTWARE™	
*Perfect Writer	$249
*Perfect Speller	$129
*Perfect Filer	$189
TCS ACCOUNTING™	
General Ledger	$ 99
Accounts Payable	$ 99
Accounts Receivable	$ 99
Payroll	$ 99
All four above	$249
Inventory Management	$ 99
TRSDOS Accounting Package	$199
ASHTON-TATE™	
dBASE II	$495
SORCIM™	
*SuperCalc	$199
***SPELLGUARD™**	$179
SMARTERM™	$ 49
ARTIFICIAL INTELLIGENCE™	
Medical Billing	$495
Dental Billing	$495
CBASIC™	$ 99
***SELECT™** "The Word Processor"	$395
MICROSOFT™	
Softcard	$289
Videoterm (Videx™)	$279
Ram Card	$169
All three above	$579
MBASIC	$279
FOX AND GELLER™	
Quickcode	$239
CONDOR I™ (Data Base)	$209
THE WORD PLUS™	$129
IUS™	
*Easywriter II	$269
*Easyspeller	$139
ISI	
**T.I.M.	$349

Price includes manuals.

*These programs are also available for IBM ®/PC.

**Only for IBM ®/PC.

THE 800-SOFTWARE PROMISE.

We are dedicated to providing the finest software at the lowest possible price. Plus the personal service you expect and deserve. Count on us for:

- The lowest prices anywhere. High volume selling makes it possible.
- Fast delivery. We process every order the same day we get it.
- Giant inventory. Everything's in stock so you don't have to wait.
- Technical support. We back up what we sell.
- Specialist expertise. We are the business CP/M ® software experts and can serve you better. Let us prove it.

Pick up the phone and pick up a bargain.

VISA MasterCard AMERICAN EXPRESS

TO ORDER, CALL TOLL-FREE:

800-227-4587

In California 800-622-0678

CA residents add sales tax.

OR WRITE:

800-SOFTWARE, INC.

185 Berry Street, Suite 6820, San Francisco, CA 94107

☐ Purchase orders accepted.
☐ Prompt UPS 3 day Blue Label service.
☐ Call for shipping charges.

CIRCLE 169 ON READER SERVICE CARD

surplus exceeds a "threshold" of ten points, and is enough to allow the trailing candidate to catch up to the next one. In the sample election, if surplus had been redistributed whenever it was over ten points, there would have been ten tallies instead of six. If the threshold had been one point instead of ten, it would have taken 14 tallies.

History

The most flexible method of proportional representation, the Single Transferable Vote, was invented independently by Andrae in Denmark in 1855 and by Thomas Hare in England in 1857. It is used in public elections in the Republic of Ireland, Northern Ireland, Australia, New Zealand, several cities in Canada, in the Church of England, and in many private societies.

In the United States, proportional representation in the form of STV has been used notably in municipal elections in Cincinnati, New York City and Cambridge, MA. It is still used in Cambridge and in the New York City school board elections.

Cincinnati and New York have similar histories in the use of proportional representation. Both adopted STV as part of a reform in reaction to a party machine that held power out of proportion to its numbers. In both cases, on the council elected under STV, seats were held by the machine and other groups in proportion to their voting strength. In both cases, the machine attempted repeatedly to repeal STV, succeeding finally when voters were alarmed by an unpopular group gaining a seat. New York used STV for ten years, Cincinnati for 33.

Some Pros And Cons

The ideal of democracy is the entire population debating and voting on issues. STV comes close to that ideal by providing a representative body in which opinions on major issues are present in the same proportions as in the population. It provides an automatic responsiveness to new issues and new coalitions. However, it is harder to explain to voters, and more complicated to carry out.

A small city is perhaps an ideal place to try STV. Most city councils are elected either at large or from wards. The usual at-large election can allow a plurality to win all the seats. Using wards or districts guarantees representation to some groups that are concentrated geographically, but a large minority spread evenly through the city could still be without representation. Elections at large by STV would assure them representation regardless of where they live.

A state legislature would be too large for a single ballot. One could group

```
1160  GOSUB 9000
1200  REM  C O U N T   V O T E S
1201  REM    &  W I N N E R S
1210  GOSUB 4000
1220  REM   R E P O R T
1225  LET ITER = 1
1230  GOSUB 5000
1300  FOR ITER = 2 TO 1E15
1305  IF WINNERS >  = VACANCIES OR C8 <  = VACANCIES THEN 1900
1310  REM   F I N D   G I V E R
1320  GOSUB 2000
1330  IF SUM(GIVER) < .5 THEN 1800
1600  REM   R E T A L L Y
1610  GOSUB 3000
1620  REM   S U M  U P
1630  GOSUB 4000
1640  REM   R E P O R T
1650  GOSUB 5000
1800  NEXT ITER
1900  REM
1999  STOP
2000  REM ----------------------
2010  REM  FIND HIGH, LOW
2020  REM -----------------------
2030  FOR CNDNO = 1 TO C9
2040  IF Z(CNDNO) >  - 1 THEN 2060
2050  NEXT CNDNO
2060  LET HIGH = CNDNO
2070  LET LOW = CNDNO
2080  LET L2 = C9 + 1
2090  LET SUM(C9 + 1) = QUOTA
2100  FOR CNDNO = CNDNO + 1 TO C9
2110  IF Z(CNDNO) =  - 1 THEN 2200
2120  IF SUM(CNDNO) <  = SUM(HIGH) THEN 2140
2130  LET HIGH = CNDNO
2140  REM
2150  IF SUM(CNDNO) >  = SUM(L2) THEN 2200
2160  LET L2 = CNDNO
2170  IF SUM(LOW) <  = SUM(L2) THEN 2200
2180  LET L2 = LOW
2190  LET LOW = CNDNO
2200  REM
2210  NEXT CNDNO
2300  REM
2310  PRINT "HIGH = ";HIGH;
2320  PRINT "; LOWS = ";LOW;" ";L2
2330  LET DFF = SUM(L2) - SUM(LOW)
2340  PRINT "TOTAL SURPLUS = "; INT (S2 + .5);"; DIFFERENCE =
"; INT (DFF + .5)
2350  REM  HIGH OR LOW?
2360  IF S2 > DFF AND S2 > 10 THEN 2500
2370  REM
2400  REM NO SURPLUS; DROP LOW
2410  LET GIVER = LOW
2420  LET Z(LOW) =  - 1
2430  LET FRACT = 1
2440  PRINT "ELIMINATE CANDIDATE ";LOW
2450  GOTO 2600
2460  REM
2500  REM  REDIST HIGH
2510  LET GIVER = HIGH
2520  LET FRACT = 1 - QUOTA / SUM(HIGH)
2530  PRINT "DISTRIBUTE EXCESS OF CANDIDATE ";HIGH
2600  REM  END OF BRANCH
2610  RETURN
3000  REM ----------------------
3010  REM  TRANSFER POINTS
3020  REM ----------------------
3060  FOR BLTNO = 1 TO B9
3070  IF TALLY(BLTNO,GIVER) < .5 THEN 3340
3075  REM
3100  REM   FIND BLTNO'S  NEXT
3110  REM  ELIGIBLE CHOICE
3120  REM  AFTER GIVER.
```

DISCOUNT SOFTWARE HOUSE™

OUR PRICES ARE UNBEATABLE !

LOOK AT THESE TYPICAL VALUES FOR THE APPLE:		LIST PRICE	YOUR COST
ON-LINE	*TIME ZONE*	99.95	**65.95**
ON-LINE	*FROGGER*	34.95	**19.95**
CONTINENTAL	*THE HOME ACCOUNTANT*	74.95	**49.95**
QUALITY SOFTWARE	*BAG OF TRICKS*	39.95	**26.95**
STONEWARE	*D.B. MASTER*	229.00	**151.95**
T.G. PRODUCTS	*JOYSTICK*	59.95	**39.95**
D.C. HAYES	*MICROMODEM II*	379.00	**269.95**
INSOFT	*ELECTRIC DUET*	29.95	**19.95**
HAPP ELECTRONICS	*HI-FI ADAPTOR*	25.00	**17.95**
BRODERBUND	*CHOPLIFTER*	34.95	**23.95**

CALL OR WRITE FOR FREE CATALOG

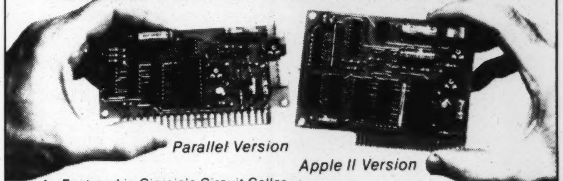
— SPECIFY COMPUTER TYPE —

AT THESE PRICES, WE MUST HAVE A 50.00 MINIMUM ON ALL ORDERS
VISA & MASTER CHARGE ACCEPTED — ADD 4%
PERSONAL CHECKS & MONEY ORDERS — ADD $ 2.00 FOR SHIPPING
WISCONSIN RESIDENTS ADD 5% SALES TAX
WE WILL SHIP UPS, FOB, COD

DISCOUNT SOFTWARE HOUSE P.O. BOX 93 WINNEBAGO, WISCONSIN 54985 (414) 231-1696

CIRCLE 314 ON READER SERVICE CARD

SWEET-TALKER, IT GIVES YOUR COMPUTER AN UNLIMITED VOCABULARY.



As Featured in Ciarcia's Circuit Cellar,
Byte Magazine, September 1981.

The Sweet-Talker voice synthesizer allows you to add speech of unlimited vocabulary to your computer. Utilizing the Votrax SC-01A chip, you can output any message by programming individual phonemes. Comes in two versions; one plugs directly into your Apple II, the other connects to any computer with an 8-bit parallel printer port. + 12 volts and + 5 volts required for parallel board.

- Contains 64 different phonemes accessed by a 6-bit code.
- Automatic and manual inflection modes.
- Parallel port driven or plug-in compatible with Apple II.
- Super text-to-speech algorithm on disk for Apple II. Makes Sweet-Talker equivalent to units 3 times the cost.
- On board audio amplifier
- Sample program on cassette with Apple II board.
- Optional power supply for parallel board.

ST01	**Sweet Talker Parallel Port Board A & T**	**$139.00**
ST02	**Sweet Talker Apple II plug in board**	**149.00**
ST06	**Text-to-Speech algorithm on disk for Apple II**	**35.00**
SC01A	**Votrax Speech Synthesizer chip** **40.00 in 100's.**	50.00
UPS01	**Universal Power Supply-A & T**	**35.00**

Add $2.00 for shipping & handling.

To Order: Call Toll Free 1-800-645-3479
(In N.Y. State Call: 1-516-374-6793)
For Information Call: 1-516-374-6793

MICROMINT INC.
917 Midway
Woodmere N.Y. 11598

MICRO MINT
Largest US distributor of Votrax chips.

CIRCLE 218 ON READER SERVICE CARD

FREE CATALOG

WORLD'S LARGEST SELECTION OF COMPUTER/WP SUPPLIES AND ACCESSORIES!

- **One-Stop Shopping.** More than 2000 products – from line-printer paper to connectors and cables – to help keep your minicomputer or word processing system up and running.
- **Quick, Convenient Ordering.** Expert assistance. By mail, phone or TWX. Your verbal P.O.s are always welcome.
- **Fast Delivery.** Your order shipped in 24 hours from the Inmac Center nearest you. Overnight emergency shipments also available.
- **Risk-Free Trial.** Work-test any product in the catalog for 45 days. If not satisfied, return for full refund.
- **Guaranteed Quality.** Field-tested for precision performance and compatibility. Backed by warranties ranging up to 10 years – and some with Lifetime Guarantees.

inmac

Catalog Dept., 2465 Augustine Drive, Santa Clara, CA 95051

SEND TODAY FOR YOUR FREE 100-PAGE INMAC CATALOG OR PHONE (408) 727-1970.

Please RUSH my copy of the Inmac Catalog.

Name Title
Company Phone
Address
City State Zip

11/82

CIRCLE 189 ON READER SERVICE CARD

several (say, five) of the present districts into "super-districts" in which five representatives would be elected at large by STV.

Summary

STV is a system which holds considerable promise for providing better representation in many kinds of elections. If you have questions about how it would operate under certain circumstances, make up a set of ballots and run the program to find out. If you find the system attractive, maybe you can start it in your organizations. □

References

1. Citizens Forum on Self-Government, 47 E. 68th St., New York, NY 10021.

2. City of Cambridge, MA. *Rules for Counting Ballots under Proportional Representation,* 1941, and addendum *Transfer of Surplus Votes,* 1973.

3. Common, John R. *Proportional Representation*, Augustus M. Kelley, New York, 1976.

4. Garrett, Charles. *The La Guardia Years, Machine and Reform Politics in New York City*, Rutgers, New Brunswick, NJ, 1961.

5. Gosnell, Harold F. and Smolka, Richard G. *American Parties and Elections,* Charles Merrill, Columbus, 1976.

6. Hermens, F. A. *Democracy or Anarchy?*, University of Notre Dame, IN, 1941.

7. Lakeman, Enid. *How Democracies Vote*, Faber & Faber, London, 1974.

8. Mackenzie, W. J. M. *Free Elections*, Rinehart, New York, 1958.

9. Nassi, Isaak and Shneiderman, Ben. "Flowchart Techniques for Structured Programming," Department of Computer Science, SUNY at Stony Brook; also SIGPLAN Notices, Aug. 1973.

10. O'Leary, Cornelius. *Irish Elections 1918-77*, St. Martin's Press, New York, 1979.

11. Straetz, Ralph A. *PR Politics in Cincinnati*, NYU Press, 1958.

12. Zeller, Belle and Bone, Hugh A. "The Repeal of PR in New York City—Ten Years in Retrospect," *The American Political Science Review*, vol. XLII, Dec. 1948, pp. 1127-1148.

```
3130  FOR RANK = 1 TO C9
3140  IF BALLOT(BLTNO,RANK) = GIVER THEN 3180
3150  NEXT RANK
3160  REM  GIVER NOT ON BALLOT
3170  GOTO 3340
3180  REM  GIVER FOUND AT RANK
3190  FOR RANK = RANK + 1 TO C9 + 1
3200  LET CNDNO = BALLOT(BLTNO,RANK)
3210  IF Z(CNDNO) >  - 1 THEN 3240
3220  IF CNDNO = 0 THEN 3240
3230  NEXT RANK
3240  REM
3300  REM  GIVE SURPLUS TO CNDNO
3310  LET AMOUNT = FRACT * TALLY(BLTNO,GIVER)
3320  LET TALLY(BLTNO,CNDNO) = TALLY(BLTNO,CNDNO) + AMOUNT
3330  LET TALLY(BLTNO,GIVER) = TALLY(BLTNO,GIVER) - AMOUNT
3340  REM
3350  NEXT BLTNO
3360  RETURN
4000  REM ---------------------
4001  REM  TOTALS, QUOTA AND
4002  REM    WINNERS.
4003  REM ---------------------
4010  LET SUM = 0
4020  FOR CNDNO = 1 TO C9
4030  LET SUM(CNDNO) = 0
4040  IF Z(CNDNO) =  - 1 THEN 4090
4050  FOR BLTNO = 1 TO B9
4060  LET SUM(CNDNO) = SUM(CNDNO) + TALLY(BLTNO,CNDNO)
4070  NEXT BLTNO
4080  LET SUM = SUM + SUM(CNDNO)
4090  NEXT CNDNO
4099  REM
4100  REM   Q U O T A
4110  LET QUOTA = 10 + SUM / (VACANCIES + 1)
4120  REM
4130  REM   W I N N E R S
4140  LET WINNERS = 0
4150  LET C8 = 0
4160  LET S2 = 0
4170  FOR CNDNO = 1 TO C9
4180  IF (SUM(CNDNO) < QUOTA) THEN 4210
4190  LET Z(CNDNO) = 1
4200  LET S2 = S2 + SUM(CNDNO) - QUOTA
4210  REM
4220  IF Z(CNDNO) < 1 THEN 4240
4230  LET WINNERS = WINNERS + 1
4240  REM
4250  IF Z(CNDNO) =  - 1 THEN 4270
4260  LET C8 = C8 + 1
4270  REM
4280  NEXT CNDNO
4290  RETURN
5000  REM ---------------------
5001  REM    R E P O R T
5002  REM ---------------------
5010  PRINT
5020  PRINT "TALLY NUMBER ";ITER
5030  LET KOLUMS = 5
5040  IF D$ <  > "Y" THEN 5220
5090  REM
5100  REM   D E T A I L S
5110  PRINT
5120  FOR BLTNO = 1 TO B9
5130  LET X = BLTNO
5140  GOSUB 7000
5150  PRINT ": ";
5160  FOR CNDNO = 1 TO C9
5170  LET X = TALLY(BLTNO,CNDNO)
5180  GOSUB 7000
5190  NEXT CNDNO
5200  PRINT
5210  NEXT BLTNO
5220  REM
```

H & E COMPUTRONICS INC.

• • EVERYTHING FOR YOUR TRS-80™ • ATARI™ • APPLE™ • PET™ • CP/M™ • XEROX™ • IBM™ • OSBORNE™ • •

* TRS-80 is a trademark of the Radio Shack Division of Tandy Corp. · * ATARI is a trademark of Atari Inc. · *APPLE is a trademark of Apple Corp. · * PET is a trademark of Commodore
* CP/M is a trademark of Digital Research · *XEROX is a trademark of Xerox Corp. · * IBM is a trademark of IBM Corp. · * OSBORNE is a trademark of Osborne Corp.

NEW

★ All orders processed within 24-Hours
★ 30-Day money back guarantee

BUSINESS PAC 100

100 Ready-To-Run Business Programs

**(ON CASSETTE OR DISKETTE).....Includes 128 Page Users Manual.....
Inventory Control.....Payroll.....Bookkeeping System.....Stock Calculations.....
Checkbook Maintenance.....Accounts Receivable.....Accounts Payable.....**

BUSINESS 100 PROGRAM LIST

NAME	DESCRIPTION
1 RULE78	Interest Apportionment by Rule of the 78's
2 ANNU1	Annuity computation program
3 DATE	Time between dates
4 DAYYEAR	Day of year a particular date falls on
5 LEASEINT	Interest rate on lease
6 BREAKEVN	Breakeven analysis
7 DEPRSL	Straightline depreciation
8 DEPRSY	Sum of the digits depreciation
9 DEPRDB	Declining balance depreciation
10 DEPRDDB	Double declining balance depreciation
11 TAXDEP	Cash flow vs. depreciation tables
12 CHECK2	Prints NEBS checks along with daily register
13 CHECKBK1	Checkbook maintenance program
14 MORTGAGE/A	Mortgage amortization table
15 MULTMON	Computes time needed for money to double, triple, etc.
16 SALVAGE	Determines salvage value of an investment
17 RRVARIN	Rate of return on investment with variable inflows
18 RRCONST	Rate of return on investment with constant inflows
19 EFFECT	Effective interest rate of a loan
20 FVAL	Future value of an investment (compound interest)
21 PVAL	Present value of a future amount
22 LOANPAY	Amount of payment on a loan
23 REGWITH	Equal withdrawals from investment to leave 0 over
24 SIMPDISK	Simple discount analysis
25 DATEVAL	Equivalent & nonequivalent dated values for oblig.
26 ANNUDEF	Present value of deferred annuities
27 MARKUP	% Markup analysis for items
28 SINKFUND	Sinking fund amortization program
29 BONDVAL	Value of a bond
30 DEPLETE	Depletion analysis
31 BLACKSH	Black Scholes options analysis
32 STOCVAL1	Expected return on stock via discounts dividends
33 WARVAL	Value of a warrant
34 BONDVAL2	Value of a bond
35 EPSEST	Estimate of future earnings per share for company
36 BETAALPH	Computes alpha and beta variables for stock
37 SHARPE1	Portfolio selection model-i.e. what stocks to hold
38 OPTWRITE	Option writing computations
39 RTVAL	Value of a right
40 EXPVAL	Expected value analysis
41 BAYES	Bayesian decisions
42 VALPRINF	Value of perfect information
43 VALADINF	Value of additional information
44 UTILITY	Derives utility function
45 SIMPLEX	Linear programming solution by simplex method
46 TRANS	Transportation method for linear programming
47 EOQ	Economic order quantity inventory model
48 QUEUE1	Single server queueing (waiting line) model
49 CVP	Cost-volume-profit analysis
50 CONDPROF	Conditional profit tables
51 OPTLOSS	Opportunity loss tables
52 FQUOQ	Fixed quantity economic order quantity model
53 FQEOWSH	As above but with shortages permitted
54 FQEOQPB	As above but with quantity price breaks
55 QUEUECB	Cost-benefit waiting line analysis
56 NCFANAL	Net cash-flow analysis for simple investment
57 PROFIND	Profitability index of a project
58 CAP1	Cap. Asset Pr. Model analysis of project
59 WACC	Weighted average cost of capital
60 COMPBAL	True rate on loan with compensating bal. required
61 DISCBAL	True rate on discounted loan
62 MERGANAL	Merger analysis computations
63 FINRAT	Financial ratios for a firm
64 NPV	Net present value of project
65 PRINDLAS	Laspeyres price index
66 PRINDPA	Paasche price index
67 SEASIND	Constructs seasonal quantity indices for company
68 TIMETR	Time series analysis linear trend
69 TIMEMOV	Time series analysis moving average trend
70 FUPRINF	Future price estimation with inflation
71 MAILPAC	Mailing list system
72 LETWRT	Letter writing system-links with MAILPAC
73 SORT3	Sorts list of names
74 LABEL1	Shipping label maker
75 LABEL2	Name label maker
76 BUSBUD	DOME business bookkeeping system
77 TIMECLCK	Computes weeks total hours from timeclock info.
78 ACCTPAY	In memory accounts payable system-storage permitted
79 INVOICE	Generate invoice on screen and print on printer
80 INVENT2	In memory inventory control system
81 TELDIR	Computerized telephone directory
82 TIMUSAN	Time use analysis
83 ASSIGN	Use of assignment algorithm for optimal job assign.
84 ACCTREC	In memory accounts receivable system-storage ok
85 TERMSPAY	Compares 3 methods of repayment of loans
86 PAYNET	Computes gross pay required for given net
87 SELLPR	Computes selling price for given after tax amount
88 ARBCOMP	Arbitrage computations
89 DEPRSF	Sinking fund depreciation
90 UPSZONE	Finds UPS zones from zip code
91 ENVELOPE	Types envelope including return address
92 AUTOEXP	Automobile expense analysis
93 INSFILE	Insurance policy file
94 PAYROLL2	In memory payroll system
95 DILANAL	Dilution analysis
96 LOANAFFD	Loan amount a borrower can afford
97 RENTPRCH	Purchase price for rental property
98 SALELEAS	Sale-leaseback analysis
99 RRCONVBD	Investor's rate of return on convertable bond
100 PORTVAL9	Stock market portfolio storage-valuation program

☐ TRS-80 Cassette Version	$99.95
☐ TRS-80 (Mod-I or III), Pet, Apple or Atari Versions	$99.95
☐ TRS-80 Mod-II, IBM, Osborne and CP/M Versions	$149.95

ADD $3.00 FOR SHIPPING IN UPS AREAS
ADD $4.00 FOR C.O.D. OR NON-UPS AREAS
ADD $5.00 TO CANADA AND MEXICO
ADD PROPER POSTAGE OUTSIDE OF U.S., CANADA AND MEXICO

H & E COMPUTRONICS INC.

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

ASK FOR OUR 64-PAGE CATALOG
DEALER INQUIRIES INVITED

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

24 HOUR ORDER LINE
(914) 425-1535

ALL PRICES & SPECIFICATIONS SUBJECT TO CHANGE
DELIVERY SUBJECT TO AVAILABILITY

CIRCLE 151 ON READER SERVICE CARD

Scotch® Diskettes

Rely on Scotch® diskettes to keep your valuable data safe. Dependable Scotch diskettes are tested and guaranteed error-free. The low abrasivity saves your read/write heads. They're compatible with most diskette drives.

(800)235-4137

VISA

Dealer Inquiries Invited

PACIFIC EXCHANGES
100 Foothill Blvd
San Luis Obispo CA
93401 In Cal call
(800)592-5935 or
(805)543-1037

CIRCLE 240 ON READER SERVICE CARD

$$$ **D/Punch?** $$$

HOW WOULD YOU LIKE A 500% RETURN ON INVESTMENT IN 10 MINUTES? IN ACTUALITY, YOUR ROI INCREASES EACH TIME YOU USE D/PUNCH. D/PUNCH IS SPECIALLY ENGINEERED TO MAKE IT EASY FOR YOU TO PUNCH A CUTOUT ON YOUR FLOPPY DISKS--THEREBY ALLOWING YOU TO WRITE (SAVE) ONTO THE OTHER SIDE. WHEN YOU SEND US YOUR ORDER, BE SURE TO TELL US YOUR SYSTEM CONFIGURATION.

a) D/PUNCH	6.95
b) LABELS (100)	3.00
c) WRITE-PROTECT STICKERS (105)	2.65
d) DISK SAVER 5¼"	10.99
e) DISK SAVER RINGS (50)	5.25

ADD $2.00 FOR SHIPPING & HANDLING.
MA RESIDENTS ADD 5% TAX
SEND CHECK OR MONEY ORDER TO

D/Punch Co.
P.O. BOX 201
NEWTON HIGHLANDS, MA 02161
(617)964-2126

ALLOW 4-6 WEEKS FOR DELIVERY.

CIRCLE 166 ON READER SERVICE CARD

Finally . . . Programmers Can Express Themselves With VECTOR SHIRTS™

PROGRAMMERS DO IT WITH LOGIC
MAKES A GREAT GIFT

6.95 +
1.00 postage

A Great Way To Meet Other Computer-People
Hand-screened quality 50/50 shirts
Colors: Blue, Green, Lavender, Red, Orange, Yellow, Gray, Tan & White
Sizes: S (32-34), M (36-38), L (42-44), XL (46)
ALSO — Bumper Stickers - 1.50 + .50 postage

VECTOR ENTERPRISES
P.O. BOX 27, DEPT. CC1, CATASAUQUA, PA 18032

CIRCLE 308 ON READER SERVICE CARD

Every Vote, continued...

```
5500  REM   S U M M A R Y
5510  PRINT  TAB( KOLUMS);"SUM ";
5520  FOR CNDNO = 1 TO C9
5530  LET X = SUM(CNDNO)
5540  GOSUB 7000
5550  NEXT CNDNO
5560  PRINT
5600  PRINT  TAB( KOLUMS);"CAND";
5610  FOR CNDNO = 1 TO C9
5620  LET X = CNDNO
5630  GOSUB 7000
5640  NEXT CNDNO
5650  PRINT
5710  PRINT "QUOTA = ";QUOTA;"; ";WINNERS;" WINNERS: ";
5720  FOR CNDNO = 1 TO C9
5730  IF Z(CNDNO) <  > 1 THEN 5750
5740  PRINT CNDNO;" ";
5750  NEXT CNDNO
5760  PRINT
5770  RETURN
7000  REM --------------------
7002  REM  PRINT NUMBER IN
7003  REM      KOLUMS
7004  REM --------------------
7010  LET X =  INT (X + .5)
7020  FOR K1 = 1 TO KOLUMS
7030  IF X >  = 10 ^ K1 - .1 THEN 7050
7040  PRINT " ";
7050  NEXT K1
7060  PRINT X;
7070  RETURN
8000  REM --------------------
8010  REM  R E A D   D A T A
8020  REM --------------------
8030  READ VACANCIES,C9
8040  PRINT
8050  PRINT "BALLOTS"
8055  LET KOLUMS = 2
8060  FOR BLTNO = 1 TO 1E13
8070  FOR RANK = 1 TO C9 + 1
8080  READ CNDNO
8090  IF CNDNO <  = 0 THEN 8120
8100  LET BALLOT(BLTNO,RANK) = CNDNO
8110  NEXT RANK
8120  REM
8130  IF CNDNO < 0 THEN 8200
8140  PRINT BLTNO; TAB( 3);":";
8150  FOR RANK = 1 TO C9
8160  LET X = BALLOT(BLTNO,RANK)
8165  GOSUB 7000
8168  IF X <  = 0 THEN 8180
8170  NEXT RANK
8180  PRINT
8190  NEXT BLTNO
8200  REM --- NO MORE DATA
8210  LET B9 = BLTNO - 1
8220  RETURN
9000  REM
9010  REM  INIT TALLY
9020  REM
9030  FOR BLTNO = 1 TO B9
9040  LET TALLY(BLTNO,BALLOT(BLTNO,1)) = 1000
9050  NEXT BLTNO
9060  RETURN
10000  REM -------------------
10001  REM  DATA STATEMENTS
10002  REM  VACANCIES,
10003  REM    CANDIDATES.
10004  REM  EACH BALLOT, END-
10005  REM  ING WITH 0.
10006  REM  -1 AT THE END OF
10007  REM  THE BALLOTS.
10008  REM -------------------
55550  DATA  -1
55555  END
```

HUNTINGTON COMPUTING

ATARI®

You can always tell which things we sell for Apple and which are for Atari. All Apple prices end in a "9" and all Atari prices in a "4". For example, a $30 game would cost $25.44 for Atari and $25.39 for the Apple.

Listed below are some items from an up-and-coming company – Swifty Software, Inc. What we've seen of their products, so far, looks very good.

#1400	Space Chase (cass.)	**$13.54**
#1401	Space Chase (disk)	**$15.24**
#1402	Timebomb (cass.)	**$13.54**
#1403	Timebomb (disk)	**$15.24**
#1404	Space Shuttle Adv. (disk)	**$25.44**
#1405	Trivia Trek (disk)	**$25.44**
#1406	Fun 'n' Games (cass.)	**$16.84**
#1407	Fun 'n' Games (disk)	**$21.14**
#1408	File-It (disk)	**$29.64**
#1409	File-It C (cass.)	**$21.14**
#1410	File-It 2 (disk)	**$42.44**
#1411	Family Financier (cass.)	**$21.14**
#1412	Diskette Inventory System (disk)	**$21.14**
#1413	Datalink (disk)	**$33.84**
#1414	Tach-Master (disk)	**$25.44**
#1415	Programming Aids I (cass.)	**$12.64**
#1416	Programming Aids I (disk)	**$16.84**
#1417	Swifty Utilities (disk)	**$25.44**
#1418	Disk Sentry (hardware)	**$33.84**
#1419	800 black dust cover	**$12.64**
#1420	810 black dust cover	**$11.44**

MORE ATARI

All APX, including Eastern Front, Attank!, Wordmaker, Number Blast, 747 Landing Simulator, and many more available at 15% off list price (most available in cassette and disk).

#1300	The I Ching (Alternate Reality Software) (This is an excellent program)	**$39.00**
#855	Hodge Podge	**$16.84**
#257	Pacman	**$38.14**
#290	Caverns of Mars	**$33.94**
#290	Centipede	**$38.14**
#277	Star Raiders	**$38.14**
#1020	Raster Blaster	**$26.94**
#658	Pornopoly	**$25.44**
#920	Kayos (disk)	**$30.74**
#742	Darts/Tilt	**$21.94**
#373	Shooting Arcade (disk)	**$25.44**
#371	Clowns and Balloons (disk)	**$25.44**
#362	Pacific Coast Highway (disk)	**$25.44**
#370	Pacific Coast Highway (cass.)	**$25.44**
#369	Canyon Climber (disk)	**$25.44**
#880	Pool 1.5	**$30.74**
#1210	Alien Swarm (disk)	**$29.64**
#1080	Deadline	**$42.44**
#980	K-razy Shootout (cart.)	**$42.44**
#1270	Mastertype	**$33.94**
#481	Letter Perfect	**$127.44**
#1100	Megalegs (cass.)	**$29.64**
#468	Frogger	**15% off list**
#461	Wizard and the Princess (disk)	**$27.94**
#460	SoftPorn Adventure (disk)	**$26.34**
#560	Ali Baba (disk)	**$28.94**
#1171	Deluxe Invaders (cart.)	**$33.94**
#1143	Cyclod (disk)	**$25.44**
#1141	Space Eggs	**$25.44**
#1192	Black Forest (disk)	**$21.14**
#668	Nautilus (cass.)	**$25.44**
#667	Nautilus (disk)	**$25.44**
#666	Chicken (cass.)	**$25.44**
#665	Chicken (disk)	**$25.44**
#664	Protector (cass.)	**$25.44**
#663	Protector (disk)	**$25.44**
#662	Disk Manager (disk)	**$25.39**
#660	File Manager 800 (disk)	**$80.24**
#501	VisiCalc (disk)	**$199.00**

Generic Computer Games (disk)
(Apple #8109)
$9.99
Dealer inquiries tolerated

Softlights

By Fred Huntington

Finally – Time for the Great Grandma Huntington sayings contest winners. Congratulations to Hartley Lesser of New Hampshire and L. R. Bergsieker of St. Louis. They each win a geunine Epson watch.

Here are some of the sayings L. R. Bergsieker submitted:

Great Grandma Huntington says:

- A barking drive never bytes.
- Hell hath no fury like an accidental reset.
- All good things come to he who jumps to $FCA8.
- There are a number of things that can fail, but they're usually in hex.
- All family trees have at least one bad branch error.
- You can't get serial output from a cornflakes box.

And now some of the repartee from Great Grandma Huntington courtesy Hartley Lesser:

- Said Great Grandma Huntington of her grandson upon the day of his birth, "My goodness, he's a bit off the old chip."
- There is absolutely no truth to the rumor that Great Grandma is too involved in computing. Just because all were invited to a Thanksgiving turnkey dinner means nothing.
- Great Grandma Huntington was in a real fix. She has just completed entry an important letter into a word processor, but couldn't get the printer to function properly. Exasperated, she finally shrugged her shoulders and gave up. "Someday my prints will come," she muttered on her way for help.

Many thanks to all those who entered. We'll be printing more Great Grandma sayings in the future. Look next year for our first book publishing effort, The First Collection of Great Grandma Sayings.

If you still have some good sayings or jokes, send them in and the best ones will be used in the forthcoming book. Any sayings used will earn a Great Grandma Tee-shirt for its author. All entries become the property of Huntington Computing and will not be returned.

ELEPHANTS $17.99

We are totally sold on the Elephant Memory Systems disks. We sell thousands of them every month and almost never run across a bad one.

We want people to try them out to see how good they really are. So, until Nov. 30 (absolute deadline), we'll sell Elephant disks ten for $17.99 (plus two dollars postage for up to five boxes – foreign extra). The postage for six or more boxes is $4.00 (foreign extra).

Here's a super incentive. Buy ten boxes for $175 (plus postage).

These disks are 100% certified and come complete with hub rings and a lifetime guarantee. They work with Apple and Atari but not with IBM PC.

APPLE®

We stock almost 2,000 different products for the Apple, plus we special order others. Obviously, we can't list all we carry in the limited space we have here. Here is a sampling of what we carry. These are our **everyday prices** – not sale prices.

#9408	Self-Concept and Work	**$26.29**
#9669	Hodge Podge	**$16.89**
#3259	Apple Mechanic	**$24.99**
#6950	BPI General Ledger	**$335.69**
#1968	Star Blazer	**$25.39**
#1970	Chop Lifter	**$29.69**
#1971	Serpentine	**$29.69**
#9580	The Menu II (C&H)	**$33.89**
#7650	Pornopoly	**$25.39**
#7501	Financial Manag./Ck Writer (CMS)	**$55.19**
#7504	Financial Management III (CMS)	**$127.39**
#7368	SAMP (Conduit)	**$70.19**
#2560	Home Accountant	**$63.69**
#8480	Human Fly	**$25.39**
#9360	Menu Generator (Crane)	**$35.09**
#2030	Dinosaurs (Cross)	**$12.69**
#3108	MIRV (Dakin 5)	**$25.39**
#8907	Kids and the Apple (book)	**$17.99**
#9740	Volcanoes	**$43.49**
#6709	Physics/Free Fall (Ed Courseware)	**$28.09**
#6365	Critical Reading	**$35.99**
#1920	Algebra III	**$33.89**
#1913	Rendevous	**$33.89**
#8420	Apple Training Tapes (Fliptrack)	**$44.99**
#6452	Spanish Hangman	**$26.99**
#4951	H&H Auto Stock Tracker	**$254.99**
#6529	Clock (Hartley)	**$33.89**
#1164	Pie Writer (80-col.)	**$127.39**
#2453	The Tool	**$335.69**
#9010	The Wurst SALE	**$10.00**
#9012	Understand Yourself	**$24.95**
#9014	Computer Almanac	**$24.95**
#9882	Deadline	**$42.39**
#3652	Electric Duet	**$25.39**
#9060	Mathemagic	**$80.89**
#6380	Crossword Magic	**$39.99**

ALL MECC IN STOCK!!!!!!

#2260	SAT English I	**$25.49**
#12	MIMCO Joystick	**$59.95**
#1477	Castle Wolfenstein	**$25.39**
#1475	Robot Wars	**$33.89**
#1115	Marauder	**$29.69**
#6761	20,000 Leagues	**$29.69**
#1759	Graphics Magician	**$53.89**
#2181	Zoom Graphics	**$35.89**
#4252	Star Blaster	**$25.39**
#4206	German Vocab. Drill	**$21.19**
#2005	Bag of Tricks	**$33.89**
#860	R & H Super Fan	**$64.99**
#997	Cytron Master	**$33.89**
#998	Galactic Gladiator	**$33.89**
#1018	Pursuit of Graf Spree	**$50.89**
#1409	Graphics Combo Pack	**$101.79**
#9220	Quest for the Holy Grail	**$22.39**
#1220	Apventure to Atlantis	**$33.89**
#1213	Global PLE	**$55.19**
#1820	VisiCalc	**$199.00**
#5623	Apple Basic Data Files (book)	**$11.66**
#9121	Space Mouse	**$44.49**
#3501	Nykrom Super Diagnostics - (SALE)	**$55.00**
#8181	Bez-Man	**$19.49**
#115	A2D Joystick 2001	**$37.99**
#116	A2D Paddles	**$29.69**
#3112	Fantasy Combo	**$50.89**
#1975	Hardhat Noah	**$25.39**
#1972	HIRES #1 Deadly Secrets	**$29.69**
#8482	CPU Auto Atlas	**$40.29**
#8122	Word Race	**$21.19**
#4701	Pro Football	**$44.89**
#4700	Win at the Races	**$44.89**
#7960	Business Pack 100	**$89.89**
#8940	Exec. Briefing System	**$169.09**
#8560	Transend I	**$75.00**
#8562	Transend II	**$129.00**
#8260	Tai Pan	**$33.89**
#5209	Basic Conversions Handbook	**$7.09**
#5208	Softside Sampler (book)	**$7.99**
#5680	Nibble Express II (book)	**$11.59**
#8280	The Accountant (DSS)	**$109.59**

Call Toll-Free **800-344-5106** (outside California)

HUNTINGTON COMPUTING
Post Office Box 1297
Corcoran, California 93212

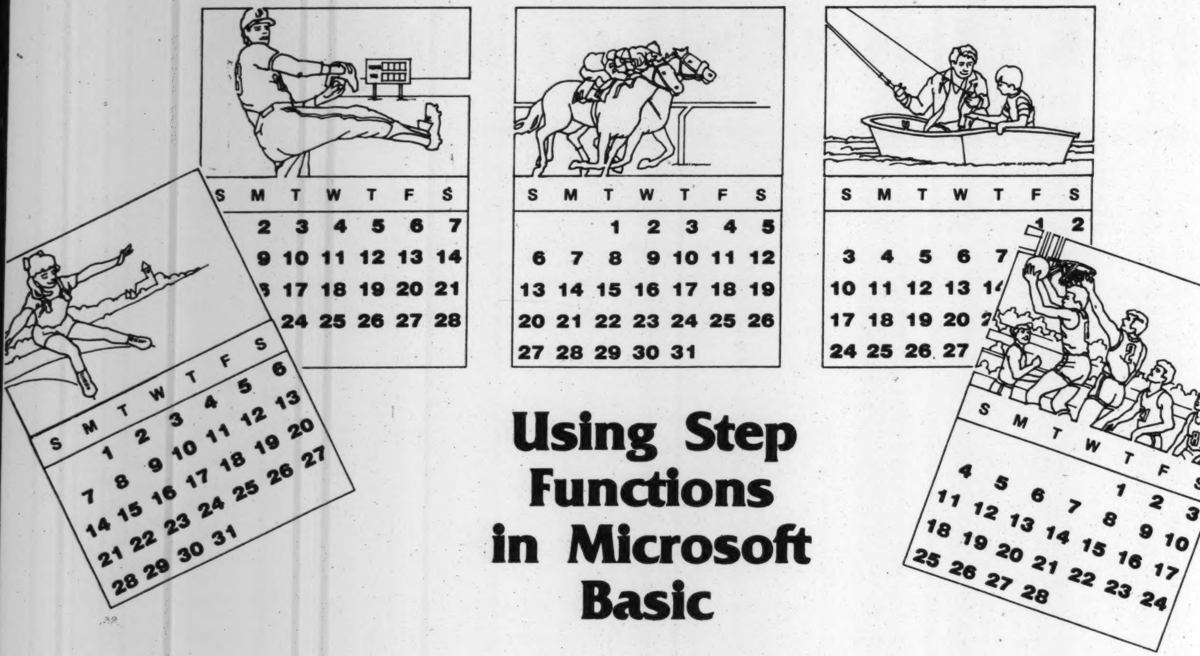
Foreign Orders 209-992-4481
In California 800-692-4146

Apple™ is a registered trademark of Apple Computer, Inc
Pet™ is a registered trademark of Commodore
TRS-80™ is a registered trademark of Tandy Corp
Atari™ is a registered trademark of Atari, Inc

Outside Calif. 800-344-5106

We take **MasterCard, American Express or VISA** (Include card # and expiration date). California residents add 6% tax. Include $2.00 for postage. Foreign and hardware extra. Foreign (excluding Canada) remit U.S. currency, checks on U.S. banks, use listed charge cards, or make direct wire transfers through Security Pacific Bank, Corcoran, for a $6.00 charge. All overseas orders shipped by air. Send for free catalog. Prices subject to change without notice.

CIRCLE 185 ON READER SERVICE CARD



Using Step Functions in Microsoft Basic

Daniel Smith

A little known feature of Microsoft Basic interpreters is their ability to treat boolean expressions as numbers. For example, the statement:

PRINT (1=1), (2<1)

yields the results -1 and 0. When told to print the expressions, Basic arrives at the boolean result and returns it to the PRINT statement as a number. True expressions return - 1 because the interpreter represents true as 11111111 binary, and that is the numerical value for -1. False expressions return 0 because false is represented as 0.

This feature can be used to build compact step functions. A step function is an equation that is built in increments of 1.

Step functions are valuable tools for mathematicians because you can approximate any curve with a step function if you make it long enough. For example, a square wave is a crude approximation of a sine wave. You can improve the approximation by using shorter and shorter steps, until you arrive at a sine wave that looks like a staircase. Continue the process and eventually the eye cannot tell the difference between the sine function and the step function.

Bar graphs are all step functions. Step functions are commonly found in mathematical modeling and statistical analysis. In fact, whenever you are trying to fit a curve to data with a computer, it is often easier and more accurate to represent it with a step function than with a formula.

So, how do you use boolean arithmetic to build a step function? Boolean expressions return 0 or 1. (In our case -1, but we can drop the sign several ways.) Consider the expression X* (Y<5). If Y is less than 5, X will be multiplied by 0 and vanish. If Y is 5 or more, the expression reduces to -X.

To demonstrate how useful this technique can be, let's use it to convert dates from month-day-year format to Julian dates. (For example, February 17 is day 48 in Julian format.)

We begin with an approximation. The average month is about 30.42 days long. Let M=month, D=day, Y=year, and J=Julian day. The Julian date should be about:

J=INT((M-1)*30.42) +D

Next we look at specifics. February 28 is Julian 59, but our formula yields 58, so we add a day for February dates. Note that we subtract to convert that pesky -1 to 1. You may prefer to use an ABS function.

J=INT((M-1)*30.42) -(M=2) +D

Now we notice that if the month is between March and July, our formula yields a date one day too big. We compensate:

J=INT((M-1)*30.42-(M=2)+
(M>2 AND M<8)+D

Now the formula works unless it is a leap year. If it is a leap year and the month is March or later we need to add a day:

J=INT((M-1)*30.42)-(M=2)+(M>2
AND M<8)-(M>2 AND
INT(Y/4 *4=Y)+D

There. A one line Julian conversion equation.

In business applications we often need to find the distance between two dates. In fact, entire legions of programmers are planning a one year leave of absence commencing December 31, 1999, when their date routines crash into the new century.

Say you want to prepare a 30-60-90 day aging report. Julian dates are clumsy to work with in the period from November to February. One way to handle the problem is to convert the date into the number of days from a common reference point, say the start of the century. Call it C.

C=J+365*Y+INT((Y-1)/4)+1

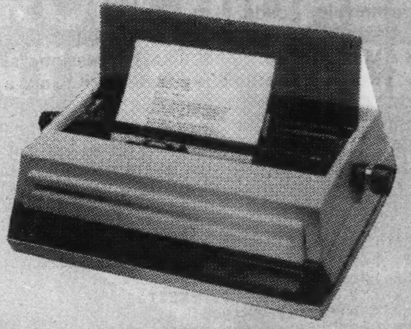
Given C, we can derive other useful functions, including functions to convert back into month-day-year format.

To demonstrate the technique, we prepared a short program that prints

---

Daniel Smith, DCS Software Products, 2729 Lowery Ct., Zion, IL 60099.

Smith Corona TP-1 TEXT PRINTER



$\$599^{88}$ UPS DELIVERED

- 120 words/min (12 cps) with full letter-quality
- Either parallel or RS-232C interfacing available (specify)
- 10 or 12 pitch (characters per inch) available (specify)
- Friction feed on 10½" printable line; takes 4-part forms

Okidata Printers

MICROLINE 80	$\$349^{88}$
MICROLINE 82A	$\$439^{88}$
80/82A TRACTOR	$\$59^{88}$
MICROLINE 83A	$\$694^{88}$
OKIGRAPH ROM	$\$44^{88}$
RS-232C 2K BUFFER	$\$159^{88}$
MICROLINE 84 Parallel 200 cps	$\$1044^{88}$
MICROLINE 84 RS-232C 200 cps	$\$1164^{88}$

Anadex Printers

DP-9500A	$\$1469^{88}$
DP-9510A	$\$1469^{88}$
DP-9620A	$\$1569^{88}$

Brother Printers

DAISYWRITER 2000—Includes Parallel, RS-232C, IEEE488, & Current Loop interfacing standard	$\$1089^{88}$
CABLES	$\$49^{88}$
TRACTOR	$\$149^{88}$

Centronics Printers

CENTRONICS 122	$\$979^{88}$
CENTRONICS 739 Parallel Interface	$\$564^{88}$
CENTRONICS 739 RS-232C Interface	$\$679^{88}$
739 COLOR OPTION	$\$79^{88}$

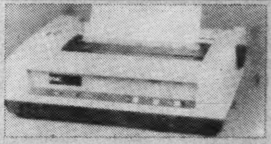
IDS Printers

PRISM 80	$\$999^{88}$
Includes Sprint Mode, Dot Plot, and Cut Sheet Guide	
PRISM 132	$\$1699^{88}$
4-Color Graphics, Sprint Mode, Dot Plot, and Cut Sheet Guide	

CALL FOR PRICES

On NEC Spinwriters, Qume & Diablo Daisywheels. QUANTEX, DATASOUTH, DIP, MPI and other printers available.

TEC Printers



DMP85	$\$469^{88}$

Generic version of NEC & Prowriter printers. Features 120 cps, bi-directional, logic-seeking, 1.3K buffer. 5 fonts, 8 sizes on 9x9 matrix, w/proportional print, true descenders, & Greek/Math font. 160 x 144 dots/inch Hi-Res graphics matrix, 1/144" line feed. Friction & tractor standard, rear paper path. Parallel only.

NEC PC-8023A-C	$\$509^{88}$
C.ITOH PROWRITER	$\$499^{88}$
C.ITOH PROWRITER Parallel & RS-232C	$\$614^{88}$
C.ITOH PROWRITER 2	$\$734^{88}$
C.ITOH PROWRITER 2 Parallel & RS-232C	$\$794^{88}$
F-10/40 STARWRITER 40cps Parallel or RS-232C	$\$1499^{88}$
F-10/55 PRINTMASTER 55cps Parallel or RS-232C	$\$1799^{88}$
F-10 TRACTOR	$\$289^{88}$

Cables & interfaces available for the Apple, Atari, CBM/Pet, IBM PC, Osborne and TRS-80s

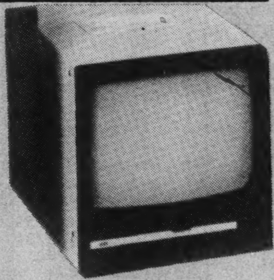
Hayes Smartmodem

HAYES SMARTMODEM	$\$229^{88}$
HAYES 1200 BAUD SMARTMODEM	$\$574^{88}$

MODEMS

HAYES MICROMODEM II	$\$299^{88}$
SIGNALMAN MARK I	$\$89^{88}$
NOVATION AUTO CAT	$\$224^{88}$
NOVATION APPLE CAT	$\$334^{88}$
NOVATION 1200 BAUD AUTO CAT	$\$569^{88}$
NOVATION 1200 BAUD APPLE CAT	$\$579^{88}$

USI Pi Series



20 MHz bandwidth, 1000-line-at-center resolution, 80 columns by 24 lines—the USI Pi-3 with amber screen redefines quality. Amber makes any display easier to read all day, every day. Used by **THE BOTTOM LINE**'s president, the USI Pi-3 Amber Monitor comes with his personal recommendation.

USI Pi-1 (9" Green)	$\$164^{88}$
USI Pi-2 (12" Green)	$\$174^{88}$
USI Pi-3 (12" Amber)	$\$199^{88}$
USI Pi-4 (9" Amber)	$\$169^{88}$

Amdek Monitors

AMDEK 300G 13"	$\$179^{88}$
AMDEK Color I	$\$379^{88}$
AMDEK Color II High Resolution RGB	$\$799^{88}$
AMDEK Color III (RGB)	$\$499^{88}$

Zenith Monitors

ZENITH ZVM-121 (12" green)	$\$139^{88}$

IBM Products

Quadram

QUADBOARDS

Memory in 64K blocks (up to 256K), a centronics-compatible parallel I/O with hardware to an external port, an asynchronous RS-232C communications port (DB-25 male external), and a clock/calendar with on-board battery—all of this on one QUADBOARD. Exceptional quality & design leaving remaining IBM PC slots free for other applications

64K QUADBOARD	$\$439^{88}$
128K QUADBOARD	$\$539^{88}$
192K QUADBOARD	$\$629^{88}$
256K QUADBOARD	$\$719^{88}$
64K MEMORY CHIPS (PKG. 9)	$\$99^{88}$

QuCeS Inc.

Big Blue for the IBM PC features a Z80 microprocessor running at 5.5 MHz, 64K memory, a centronics-compatible parallel port, the RS-232C port, an on-board calendar/clock, & a hard disk interface.

BIG BLUE	$\$519^{88}$

QuCeS Hard Disk subsystems for the IBM PC.

6mB HARD DISK	$\$2489^{88}$
12mB HARD DISK	$\$2839^{88}$
24mB HARD DISK	$\$4229^{88}$

Xedex

BABY BLUE	$\$539^{88}$

MicroSoft

64K RAMcard	$\$274^{88}$
64K MEMORY CHIPS (PKG. 9)	$\$99^{88}$

Maynard Electronics

FLOPPY DISK CONTROLLER	$\$189^{88}$

Tandon Drives

40 TRACK, SS	$\$229^{88}$
40 TRACK, DS	$\$319^{88}$

IBM PC Software

We carry a full line of IBM PC Software. Also Apple/Franklin software. Ask about our Software Society discounts.

Orders & Information: CALL (603)-673-8857

Orders Only: CALL (800)-343-0726

No Hidden Charges

No surcharge for credit cards—No charge for UPS shipping—Stock shipments next day All equipment shipped factory fresh with manufacturer's warranty—We accept CODs Open PO's not accepted—$50 minimum order—No foreign orders accepted

Prices subject to change—call for quotes

VISA MasterCard

HIGH TECHNOLOGY AT AFFORDABLE PRICES

THE BOTTOM LINE

Milford NH 03055-0423

CIRCLE 124 ON READER SERVICE CARD

SRA Educational Courseware: "Because learning matters"

Computer Drill and Instruction: Fact Track™ (Grades 1-6)
For your Apple*, Atari*, IBM* and Radio Shack* personal computers.

Fact Track gives timed drill on the facts of addition, subtraction, multiplication, and division and reports student speed and performance. Choice of difficulty level. Choice of competitive or noncompetitive format. Choice of drill type: facts, mixed practice with facts, extension skills. Binder with Diskette and Teacher Guide, $100.00.

*Registered trademarks.

☐ Yes! I want Fact Track!
Please contact me immediately.
☐ Send me literature about Fact Track.

Name________________
School________________
Address________________
City, State, Zip________________
Telephone________________

For faster service, call SRA toll-free:
(800) 621-0476
Or mail this coupon to:

SRA®

SCIENCE RESEARCH ASSOCIATES, INC.
155 N. Wacker Drive, Chicago, IL 60606

CIRCLE 289 ON READER SERVICE CARD

Step Functions, continued...

calendars. You supply a year between 1900 and 1999. The program was developed on an OSI C3-OEM, but it should work on any computer that uses a Microsoft Basic interpreter—Apple, TRS-80, PET, etc.

Statements using boolean expressions have been flagged with remarks. Notice that the FOR-NEXT loop in line 1070 identifies leap years with a step function. The program requires only 27 lines of code.

Of course, while other languages do allow boolean expressions as part of arithmetic equations, it is not a standard feature of Basic. You should use the technique with care, and document each occurrence with a remark. But the technique is simple, easily understood, and can save you many lines of code. ☐

```
1000 REM CALENDAR - PREPARES CALENDARS USING STEP FUNCTIONS
1010 DATA JANUARY, FEBRUARY, MARCH, APRIL, MAY, JUNE, JULY, AUGUST
1020 DATA SEPTEMBER, OCTOBER, NOVEMBER, DECEMBER
1030 DIM MO$(12) : FOR I=1 TO 12 :READ MO$(I) :NEXT
1040 INPUT"ENTER YEAR (1900-1999)";Y :Y=Y-1900
1050 D=1 :M=1 :GOSUB 2000:REM GET JULIAN AND #DAYS SINCE 01/01/1900
1060 PRINT#P,TAB(20);1900+Y :PRINT#P,TAB(21)"----"
1070 FOR I=C TO C+364 -(Y=INT(Y/4)*4)                          :REM STEP
1080 C=I :GOSUB 3000 :REM GET M,D,Y
1090 IF D=1 THEN PRINT#P :PRINT#P :PRINT#P,TAB(20);MO$(M)
1100 W=I-INT(I/7)*7-7*(I=INT(I/7)*7)                           :REM STEP
1110 PRINT#P,TAB((W+1)*4);D; :IF W=7 THEN PRINT#P
1120 NEXTI
1130 END
2000 REM GIVEN M,D,Y RETURN J=JULIAN DAY AND C=#DAYS SINCE 01/01/1900
2010 J=INT(30.42*(M-1)) -(M=2) +(M>2 AND M<8) -(M>2 AND INT(Y/4)*4=Y)+D
2020 C=J+365*Y+INT((Y-1)/4)+1
2030 RETURN
3000 REM GIVEN C=#DAYS SINCE 01/01/1900, RETURN J=JULIAN, M,D,Y
3010 L=INT(C/1461.1):REM #LEAP YEARS SINCE 1900
3020 Y=L*4-(C>(L*1461)+366)*(INT((C-L*1461-366)/365.1)+1):REM STEP
3030 J=C-Y*365 -INT(Y/4)+(Y>0) -(INT(Y/4)*4=Y)                 :REM STEP
3040 M=J +(J>59 AND INT(Y/4)*4=Y)                              :REM STEPS
3050 M=INT(M/30.42)+1 -(M=60) +(M=31) -(M=91 OR M=121 OR M=152 OR M=182)
3060 D=1 :I=C :J1=J :GOSUB2000 :J=J1 :REM FIND C FOR 01/M/Y
3070 D=I-C+1
3080 RETURN
```

Pardon Me, But... Did Your Apple™ Just...Speak?

Muse gives your computer the power of speech with **The Voice**. Use the vocabulary provided to create thousands of phrases; or put your own words in the Apple's — aah — **mouth**.

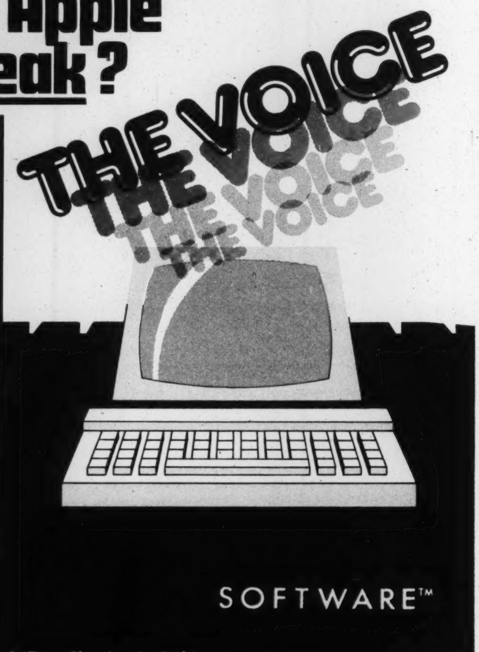
Add sound effects to your own computer games. Greet visitors. Leave messages. Use your imagination. The possibilities are actually endless.

Each disk stores up to 80 words and phrases, which can be sorted for quick reference. And, **The Voice** allows your Apple to speak from **any** Basic Program through your Print Commands.

The Voice from Muse. For your... amusement. **($39.95)**

For Apple II™ or Apple II Plus™ with 48K. Write or call Muse for information and the dealer nearest you.

Apple II is a trademark of Apple Computer Corp.



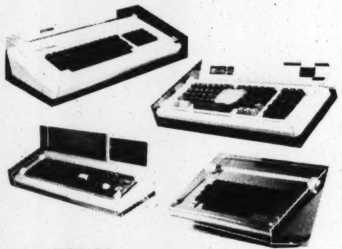
347 N. Charles St. Baltimore, MD 21201 (301) 659-7212

CIRCLE 228 ON READER SERVICE CARD

PROTECT YOUR KEYBOARD WITH

PLEXA-LOK

- *PLEXA-LOK* slips up and over the keyboard – then gently snaps into position.
- *PLEXA-LOK* allows your secretary to go on break without having to worry about visitors accidentally destroying their hours (and your $) of work.



PLEXA-LOK

- **ENHANCES** looks of your system
- **PROTECTS** keyboard from dust
- **30-DAY GUARANTEE**
- **ALLOWS** computer to remain on while unattended
- **KEYBOARD** protected from kids
- **HIGH QUALITY** Acrylic
- **SCHOOLS – A MUST!**

PLEXA-LOK COVERS

APPLE II	$19.95
TRS 80 MOD III	19.95
XEROX 820	24.95
APPLE III	24.95
FROSTY APPLE	1.50 extra

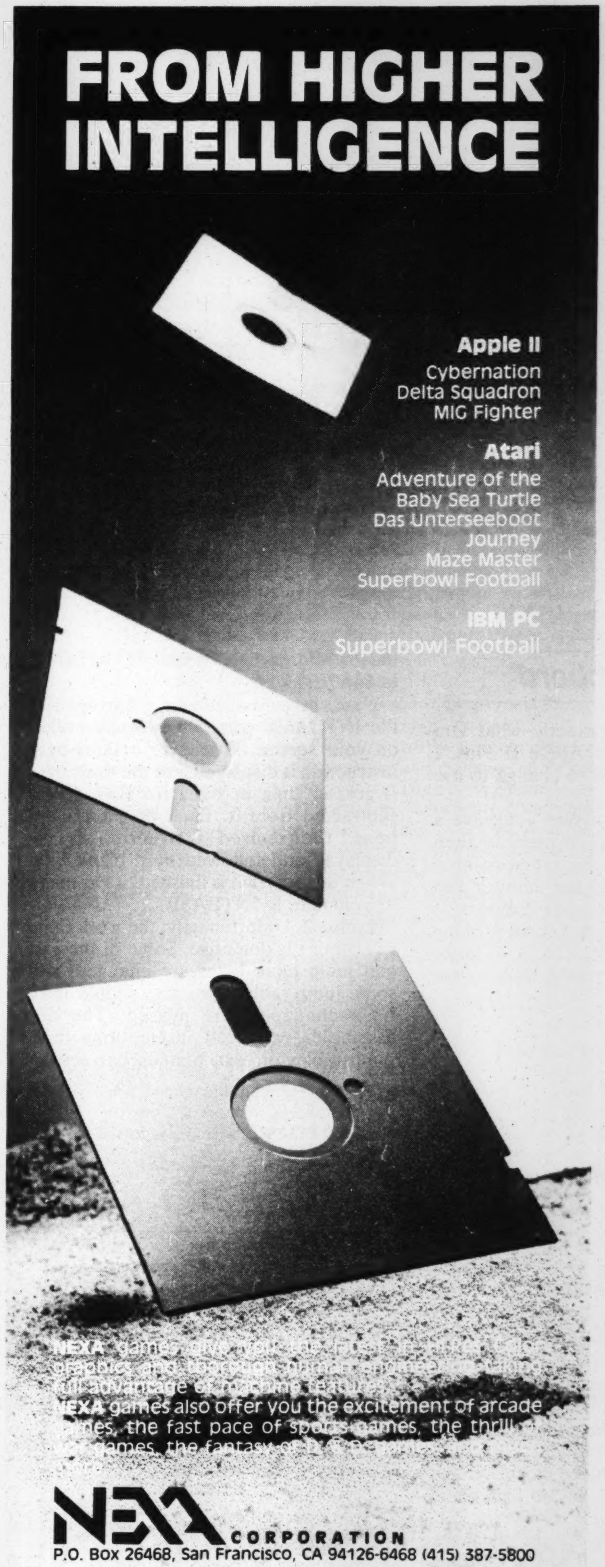
CA Residents Add 6% Tax
Allow 4-6 Weeks Delivery
Dealer Inquiries Welcome
MasterCard and Visa Accepted

LE

LAST ELECTRONICS
P.O. BOX 1300
SAN ANDREAS, CA 95249
(209) 754-1800

Introductory Special – Prepaid UPS, Continental USA

CIRCLE 198 ON READER SERVICE CARD



FROM HIGHER INTELLIGENCE

Apple II
Cybernation
Delta Squadron
MIG Fighter

Atari
Adventure of the Baby Sea Turtle
Das Unterseeboot
Journey
Maze Master
Superbowl Football

IBM PC
Superbowl Football

NEXA games give you the [illegible] graphics and [illegible] full advantage of machine features.
NEXA games also offer you the excitement of arcade games, the fast pace of sports games, the thrill [illegible] games, the fantasy of D [illegible] more.

NEXA CORPORATION
P.O. Box 26468, San Francisco, CA 94126-6468 (415) 387-5800

CIRCLE 231 ON READER SERVICE CARD

Computer Program Books for Beginners

Everything you need to start programming your own computer.

ATARI 400/800 Computers

101 ATARI Computer Programming Tips & Tricks, learn-by-doing instruction, hints, secrets, shortcuts, techniques, includes 101 ready-to-run programs, 128 pages **$8.95**
31 New ATARI Computer Programs For Home, School & Office, practical type-n-run software, 96 pages **$8.95**
ATARI Computer BASIC Coding Form, 40-sheet tablet with stiff back, makes writing programs, fun, easy **$2.95**

TIMEX 1000/Sinclair ZX-81

101 TIMEX 1000/Sinclair ZX-81 Programming Tips & Tricks, secrets, hints, shortcuts, techniques, learn-by-doing instruction, 101 ready-to-run programs, 128 pages **$7.95**
37 TIMEX 1000/Sinclair ZX-81 Computer Programs For Home, School & Office, useful type-n-run software, 96 pages **$8.95**
TIMEX/Sinclair ZX-81 BASIC Coding Form, 40-sheet tablet with stiff back, makes writing programs easy **$2.95**

APPLE Computer

101 APPLE Computer Programming Tips & Tricks, secrets, hints, shortcuts, techniques, includes 101 ready-to-run programs, 128 pages **$8.95**
33 New APPLE Computer Programs For Home, School & Office, practical type-n-run software, 96 pages **$8.95**
APPLE Computer BASIC Coding Form, 40-sheet tablet with stiff back, makes writing software fun, easy **$2.95**

TRS-80 Color Computer

101 Color Computer Programming Tips & Tricks, learn-by-doing instructions, hints, secrets, techniques, includes 101 programs, 128 pages **$7.95**
55 Color Computer Programs For Home, School & Office, practical ready-to-run software, colorful graphics, 128 pages **$9.95**
55 MORE Color Computer Programs For Home, School & Office, handy companion, packed with different useful type-n-run software, colorful graphics, 112 pages **$9.95**
Color Computer Graphics, complete guide, how to make the most of Color Computer video graphics, many complete programs, 128 pages **$9.95**
The Color Computer Songbook, 40 favorite pop, classical, folk, seasonal, type-n-run music programs to play on color computer, 96 pages **$7.95**
Color Computer BASIC Coding Form, 40-sheet tablet with stiff back, makes writing software easy, fun **$2.95**

TRS-80/Sharp/Casio Pocket Computers

99 Tips & Tricks For The New Pocket Computers, for PC-2/PC-1500, all new useful graphics & business/home/education software, 99 ready-to-run programs, 128 p **$7.95**
Pocket Computer Programming Made Easy, fast new easy read-n-learn way to quickly understand BASIC, how to make PC-1/-2/PC-1211/-1500/FX-702P work for you, 128 p **$8.95**
101 Pocket Computer Programming Tips & Tricks, secrets, hints, shortcuts, techniques, includes 101 type-n-run programs, for PC-1/PC-2/PC-1211/PC-1500, 128 pages **$7.95**
35 Practical Programs For The CASIO Pocket Computer, useful type-n-run software for FX-702P, 96 pages **$8.95**
Pocket Computer BASIC Coding Form, 40-sheet tablet with stiff back, makes writing programs a breeze **$2.95**

Order direct from this ad. Send check, money order, or Mastercard or VISA account number and expiration date. Include $1 shipping for each item ordered up to a maximum of $3. Or write for our free catalog. Mail to:

ARCsoft Publishers

POST OFFICE BOX 132 M
WOODSBORO, MARYLAND 21798
(301) 663-4444

MasterCard VISA

Customers wanting airmail send US $4 postage per item ordered Sorry, no COD.

CIRCLE 113 ON READER SERVICE CARD

INTBASIC LIVES!

A while back, Creative Computing showed how to move the mini-assembler so it could be used in an Apple II Plus without a language card. Here we describe how to move the rest of Integer Basic.

Wally Hubbard

"Unfair!" I thought. My DOS 3.3 System Master disk had a program called INTBASIC on it, but no way to run it. I had a 48K Apple, but no language card to stick into it. Just typing BLOAD INTBASIC produced nothing worthwhile. But there it was. INTBASIC. Smiling at me every time I typed CATALOG. Would I ever find out what Applevision was? Or survive without charting my Biorhythms? Or play Animals?

Actually, moving INTBASIC and getting it to work somewhere else in memory is a kind of puzzle any computer hacker would enjoy (at least the first time through). So thanks, Apple, for putting it on the disk.

I now have a working version of Integer Basic that resides at $6C00 and works with DOS. A collection of the information needed for you to get the same thing follows.

There are four listings. The first is a machine language program that makes most of the changes that are needed. Listing 2 shows the changes that must be made next. Listing 3 shows the changes that must be made to DOS 3.3. The last listing shows a HELLO program that can be used to INIT a new diskette, which you must do to record the altered DOS.

Wally Hubbard, 3174-321 Pheasant Run Drive, LaFayette, IN 47905.

Each listing shows exactly what you should type for a 48K Apple II Plus. I shall explain later what to change to use INTBASIC elsewhere.

Listing 1. First make sure you have a good copy of DOS 3.3 in memory then put INTBASIC into the memory area starting at $3000. Enter the monitor and key in the machine language program. It will work anywhere, but I show it being entered at $300 to $35C. Check to make sure you copied it correctly, then start it running.

Listing 1.

```
]BLOAD INTBASIC,A$3000
]CALL-151
*300:A9 4A 85 FB A9 00 85 FA
*308:A0 80 B1 FA 10 05 38 E9
*310:64 91 FA C8 D0 F4 84 FC
*318:84 3A A9 60 85 FD A9 30
*320:85 3B A5 25 20 C1 FB A6
*328:28 86 FE A6 29 86 FF 20
*330:D0 F8 A0 0E A9 C3 D1 FE
*338:90 10 20 53 F9 85 3A 84
*340:3B C4 FD D0 DD C5 FC 90
*348:D9 60 A0 02 B1 3A 38 E9
*350:64 91 3A 20 D0 F8 20 8E
*358:FD A9 00 F0 DD
*300G
```

The machine language program does two things. First it changes a jump table that Integer Basic uses to find where it must go to perform a command. The high address bytes in the table are now stored between $4A80 and $4AFF.

Since INTBASIC will be moved so that its starting address is $6C00 instead of $D000, the difference, $6400, is subtracted from each address in the table. The process is simplified by just subtracting $64 from each high byte and leaving the low address bytes (located from $4A00 to $4A7F) alone.

Next, in a four-minute extravaganza, the INTBASIC program is disassembled on your screen. Whenever a three-byte instruction is displayed and the third byte is greater than or equal to $D0, $64 is subtracted from it. Each time this happens, the revised instruction is redisplayed and followed by a blank line. When the program is finished, it has made 936 changes to INTBASIC.

Listing 2. Unfortunately, the work done in Listing 1 is defective. Some of the text and jump table bytes are changed, and some jump table bytes that should have been changed were missed. The disassembler can't tell instructions from jump tables or text. Sixteen corrections

Listing 2.

```
*31EE:F4
*31F1:D4
*3410:D8
*3481:F5
*34A0:DC
*3CF9:D0
*40B0:89
*4494:44
*4A0D:E2
*4A5A:D8
*4B0E:D3
*4B11:D4
*4B25:D0
*4D6A:EC
*4DB1:DD
*4DD8:F7
*5010:A9 6C 85 4D D0 0C
*5A19:F4
*5A88:EA EA
*5A95:7C
*5AFE:96
*5B00:7C
*5B1D:D3
*5EA8:99
*5FBF:9A
*5FFD:96
*5FFF:96
```

The experts are excited about GRAMMATIK™

Seldom does a new software product receive the universal praise from the experts of major microcomputer magazines that Grammatik has. Read for yourself:

Alan R. Miller, Interface Age, May 1982:

"The entire manuscript of my Fortran book was given to Grammatik. Grammatik flagged many locations throughout the book. Several doubled words were correctly flagged. Other flagged passages truly needed attention." "Grammatik found a very important pattern; the expression 'in this case' appeared 66 times. This phrase expressed four different concepts, and most of the examples were reworded." "Profile can be used to determine the frequency of word usage in a document." "Grammatik is a useful aid for professional writers. It is the perfect complement to a spelling checker."

A.A. Wicks, Computronics, June 1982:

"The manual for Grammatik is better than average. The general text and explanations are thorough, detailed, and concise." "When the program was 'test run' on some old articles of mine still on disk, I was embarrassed by some of the overworked, wordy, or trite phrases that I had used. Nevertheless, I had to agree with what Grammatik was saying, and vow to avoid these pitfalls in the future." "This is one of the most interesting and useful programs that I have had the pleasure to review. All functions operated as stated with no problems, or even a hint of a problem. And no guessing was required about exactly what some of the directions implied. Anyone involved with word processing in any way, whether writing manuals, letters, brochures, newscopy, reports, etc. is encouraged to get this excellent program."

Stephen Kimmel, Creative Computing, June 1982:

"I don't get excited about many programs. I am excited about Grammatik." "It is difficult to imagine the program being any easier to use." "I had decided that the program would be useful to a professional writer if only because it checks for double words." "I have a higher enthusiasm threshold than that. Grammatik can also be expanded to include phrases of particular significance to you. It can become your personal editor and English coach. I love to start sentences with 'and'. That's not a particularly good idea. So I added the phrase '. And' with the note to be careful not to overuse it. Now I get a reminder every time I do it. There are other words that I use too often. My copy of Grammatik checks for them, too, and gently tells me to watch out." "I like Grammatik a great deal. It is a worthy and useful addition to your word processing software."

Bob Louden, InfoWorld, December 7, 1981:

"Grammatik is the next step beyond spelling checking for serious word processors. Grammatik analyzes writing style at the word and sentence level while, at the same time, it checks for subtle spelling and typographical errors that go beyond the capabilities of conventional spelling-checking programs. If you use a word processor and a spelling checker, then you should investigate the unique capabilities of this program." "Although skeptical at first, I proceeded to run several of my published articles through Grammatik. None were free of errors." "Grammatik is a surprisingly fast and easy tool for analyzing writing style and punctuation."

Dona Z. Meilach, Interface Age, May 1982:

"The programs together (Aspen Software's spelling checker Proofreader and Grammatik) offer a dynamic tool for comprehensive editing beyond spelling corrections. It can begin where your college English teacher left off and help you analyze your documents in a way you may never have thought possible."

Eric Balkan, The Computer Consultant, Vol 2 No 9:

"As a reviewer, I'm impressed the most with the imagination that went into this product. With all the me-too software on the market, it's good to see something original come out. It's also good to see that the program author allowed the user as much freedom as he did — you can use your own imagination to extend the uses of the program."

GRAMMATIK™ + PROOFREADER™ = NO ERRORS

Together, Grammatik and the Aspen Software Company spelling checker Proofreader form an unequalled document proofreading system. Proofreader features an official version of the RANDOM HOUSE® Dictionary for a word list that you can trust! It also features immediate on-line access to the dictionary for spelling help while making corrections interactively. Proofreader is the best spelling checker available. Write or call for more details. (On-line dictionary not available on TRS-80 version.)

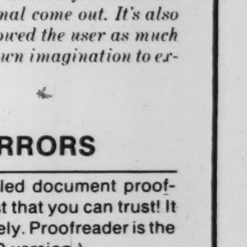
CP/M and IBM-PC DOS: Grammatik - $150.00; Proofreader - $129.00; Both - $250.00 TRS-80 Model II: Grammatik - $99.00; Proofreader - $99.00; Both - $179.00 TRS-80 Model I/III: Grammatik - $59.00; Proofreader - $89.00; Both - $139.00 Manuals only $8.00 each, $15.00 both.

IMPORTANT ORDERING INFORMATION: You MUST specify computer model, operating system, memory size and format and number of disk drives when ordering either software or manuals alone. All U.S., Canada and Mexico orders include first class shipping in price. We accept cash, check, money order, VISA and Master Card. Cost on manual only orders can be credited to final purchase. NM residents add 4% sales tax.
(Dealer and OEM inquiries welcome)
Random House is a registered trademark of Random House, Inc. Other registered trademarks: CP/M Digital Research, TRS-80 Tandy Corp.; MS-DOS Microsoft, IBM IBM, Proofreader, Grammatik Aspen Software Co.

Distributed By:

SOFTWARE
SOFTWARE
DIGITAL MARKETING
DIGITAL MARKETING™

DIGITAL MARKETING CORPORATION
2670 CHERRY LANE • WALNUT CREEK • CALIFORNIA • 94596
(415) 938 2880 • Telex 17 1852 (DIGMKTG WNCK)



Aspen Software Co.

P.O. Box 339-C Tijeras, NM 87059 - (505) 281-1634 are needed, along with a few more changes and some new instructions.

At $5010, new instructions are inserted that will automatically set HIMEM at $6C00 instead of $C000. This is necessary so that INTBASIC won't be wiped out the first time a program is loaded. The instructions at $5A88 eliminate cold restarts of your Apple from Integer Basic (unexpected rebooting of the disk).

Listing 3. Integer Basic is now in great shape for cassette use, but DOS isn't ready to deal with it yet. DOS will still look for a language card, and, not finding one, insist LANGUAGE NOT AVAILABLE if you try to run Integer Basic. That is where Listing 3 comes in.

The jump table at $9D62 must be changed. The instructions at $A5B2 and $A5BB must be changed so that DOS will check at the right memory location for INTBASIC and think it is there.

The message at $B3B0 (DISK VOLUME) is changed to reflect the fact that the DOS has been customized. The message will now read I/A DOS VOL each time the disk is CATALOGed. I/A stands for Integer/Applesoft. The change at $9D01 combined with the cold restart of DOS provided by the command 9D84G will cause DOS to stick its buffers below INTBASIC. That way you can change the number of buffers with the MAXFILES command and not worry about having INTBASIC wiped out.

Listing 4. Now it is time to taste the fruits of your labor. Enter the program shown, insert a new disk, and type INIT HELLO. Once the disk is initialized, type BSAVE INTBASIC 6C00, A$3000, L$3000. Then to test it all, type PR#6 (or whatever it takes to boot a disk on your system) and you should be using Integer Basic.

If you are not familiar with Integer Basic, you may be in for some confusion, since many of the Applesoft commands you have grown accustomed to are not available or have different spellings. Apple does offer a manual for Integer Basic that will be extremely helpful.

Moving INTBASIC Elsewhere

If you BLOAD INTBASIC somewhere besides $3000, you must adjust all of the addresses in Listing 2 accordingly. In Listing 1, change the bytes at $301, $31B and $31F. They contain the high bytes of the jump table, and start and end addresses in INTBASIC as it is currently located.

If you want to use INTBASIC somewhere besides $6C00, you must change the bytes at $310 and $350 in Listing One. Add $01 for each $100 decrease in the starting address. INTBASIC will not work anywhere. The starting address must have the form $XY00, where Y is even and X is any number.

You will have to change some of the bytes in Listings 2 and 3 also. Subtract $01 for each $100 decrease in the starting address. The addresses at which the bytes will have to be changed are shown in Figure 1.

By putting INTBASIC at $6C00 I have left a hole from $9C00 to $9CFF which may be used for machine language programs.

When I first got INTBASIC running I tried out the Integer programs on the Master disk. I can report that I was impressed by Applevision, bored by Animals, and amused by Biorhythm. I don't believe this attempt to chart biorhythms is very dependable. The program draws a chart that shows the day I was born was just an average day. I don't remember it, but I doubt that it was. ☐

References

Beneath Apple DOS, Don Worth and Pieter Lechner, Quality Software, 6660 Reseda Blvd., Suite 105, Reseda, CA 91335. Pages 7-3 and 8-32 show how to rebuild buffers and where the DISK VOLUME message is located. Many details about DOS.

Apple II Basic Programming Manual, Apple Computer Inc., 10260 Bandley Dr., Cupertino, CA 95014. The cover looks similar to the Applesoft tutorial, but this one shows what the Integer commands do. Mine cost about $10.

Figure 1.

$40B0 $5011 $5A95 $5AFE $5B00 $5EA8 $5FBF $5FFD $5FFF	(Subtract $01 from the contents of each locations for each $100 decrease in the starting address of INTBASIC.)
$9D63 $9D67 $9D69 $9D6B $A5BC $9D01 ($A5B6) ($A5BF)	(As above but these addresses will be different if DOS is not in 48K. If the addresses are different, you must also change $A5B6 and $A5BF. They contain the high byte of an address in DOS itself. Subtract $01 for each $100 decrease in memory size below $C000 (48K).)
$4494	(The contents of this address must be determined by a formula: $4494 = ($40BO - 1)/2. Example: If $40BO contains 89, $4494 must contain (89 - 1)/2 = 44. This is the reason for the restriction on the location of INTBASIC—$40B0 contains the high byte of an address and must be odd.)

Listing 3.

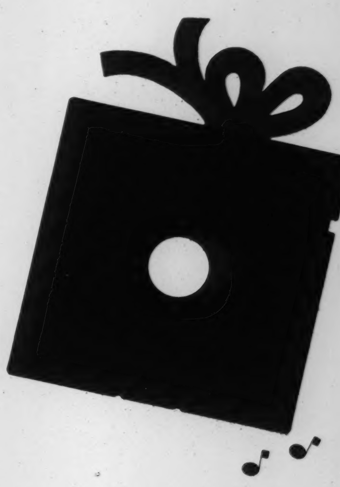
```
*9D62:36 84 E5 A4 E3 7F 00 7C 03 7C
*A5B2:A2 E0 8E 96 9D C9 4C F0 0A
*A5BB:A2 7C 8E 96 9D C9 20 60 EA EA
*B3B0:CC CF D6 A0 D3 CF C4 A0 C1 AF C9
*9D01:6B
*9D84G
```

Listing 4.

```
]
]10  HOME
]20  PRINT "LOADING INTBASIC AT $6C00":
      PRINT : PRINT "TO USE THE MINI-A
      SSEMBLER:"
]30  PRINT "  *9266G       OR": PRINT "
      ]CALL 37478"
]35  PRINT : PRINT "HIMEM IS NORMALLY SE
      T AT $6500"
]40  PRINT  CHR$ (4);"BLOAD INTBASIC 6C0
      0,A$6C00"
]50  HOME
]60  PRINT  CHR$ (4);"INT"

(NOW INSERT A NEW DISK AND TYPE:)

]INIT HELLO
]BSAVE INTBASIC 6C00,A$3000,L$3000
```

Note that if you try to run the mini-assembler from Integer Basic using CALL 37478, you will get an error message. Integer can handle only numbers between -32767 and 32767. Use CALL -28058 instead.

Psssstt...



(Jingle Bells, Jingle Bells, Jingle All The...)

We're really not rushing the season. We wouldn't even mention it if we didn't think you'd want to know.

The **Strictly Soft Ware** Holiday Catalogs (Apple & IBM) are going to be ready early this fall. More software than ever. Same great prices. And with a customer service and technical support program that's so good that...well, let's just say someone at the North Pole is on our mailing list.

If you're already on the **Strictly Soft Ware** list, you'll automatically receive our Holiday Catalog. If you're not on the list, call us (toll-free) at 1-800-848-5263. Bulk mailing starts Oct. 1.

Don't be left out in the cold by not ordering the free **Strictly Soft Ware** Holiday Catalog. It may be the nicest present you get this year.

Holiday Gift Idea #1

The ***Strictly Soft Ware*** *Subscription Plan. Prepayment allows the account to be drawn upon for whatever you want, whenever you want. When we send the package, we'll provide a balance statement as well. Here's a gift that can last all year long.*

SPECIALS

PFS Graph	$89.95	Sensible Speller	$99.99
Mathmagic	$69.95	Apple 21	$19.95
Pro Pix	$19.95	Draw Poker	$23.95
Casino	$23.95	Galactic Gladiators	$29.95
Terrapin Logo	$119.95	Computer Bismark	$44.95
World Series	$23.95	Adv. to Atlantis	$29.95

IBM • SPECIALS • IBM

Write-On	$99.99	Visicalc	$189.99
Word Star	$239.99	Visidex	$189.99
Volkswriter	$159.99	Desk Top Plan	$189.99
Data Capture 4.0	$74.95	Personal Fin. Prog.	$74.95

Above Specials In Effect Until Nov. 1, 1982

Holiday Gift Idea #2

The ***Strictly Soft Ware*** *Gift Certificate. Here's the perfect way to take the guesswork out of holiday giving. A gift certificate and the* ***Strictly Soft Ware*** *holiday catalog guarantee the perfect gift for everyone on your holiday list.*

We take Master Card or VISA (include card # and expiration date). Ohio residents add 5.5% tax. Include $2.00 for postage. 3% discount if check accompanies order.

Send for free catalog. Prices subject to change. Hrs.: 9-9 weekdays; 9-6 Sat.

Strictly Soft Ware
Post Office Box 338
Granville, Ohio 43023
order by phone **800-848-5253**
in Ohio **614-587-2938**

Strictly
Soft Ware

Apple is a registered trademark of Apple Computer, Inc.
IBM is a registered trademark of International Business Machines Corp.

CIRCLE 293 ON READER SERVICE CARD

Build a Paddle Control for Your TRS-80 Color Computer

David H. Ahl

For playing games which require movement in only one direction a potentiometer, sometimes called a paddle control, tends to provide more precise control than a joystick. This is because a joystick rotates through an arc of about 70 degrees compared to a potentiometer with 300 degrees of rotation.

Playing any of the Invaders/Galaxian family of games with the TRS-80 Color Computer joystick tends to be an exercise in frustration. You *know* you could do better were it not for that darned joystick.

Faced with this frustration, I decided to build a set of paddles for the TRS-80 Color Computer. The cost is modest—about $8.25 each or $16.50 for a pair. Most of the parts are readily available at your neighborhood Radio Shack or electronics dealer. You might have trouble finding the 5-pin 240° D.I.N. male plug. If you order by mail, be sure to specify a 240° plug as the 180° one is much more common. The 240° plug is used on some CB rigs and is sometimes available with a 5-conductor microphone cable already attached. This is perfect, although it will cost more than if you make your own.

The existing joystick schematic is shown in Figure 1. Figure 2 shows a circuit with one potentiometer that can be switched to replace either the X or Y direction with the SPDT slide switch. This is adequate for most uses.

However, if you want to use the paddle control to play a game such as *Bustout*, you would have a problem. *Bustout* normally uses a joystick and, while the game permits movement in all directions, the main movement is usually along one axis. Hence, it would be desirable to set one direction of movement at an extreme, say the bottom of the screen, and use the paddle to control right-left movement. For this, you will need the circuit shown in Figure 3. In this circuit, a 100K ohm trimmer potentiometer is used to "permanently" set one direction while the regular potentiometer controls the other direction.

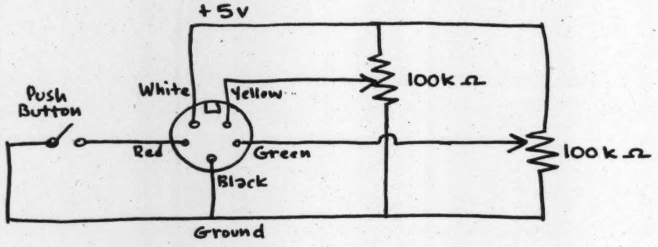


Figure 1. Existing TRS-80 Color Computer joystick schematic.

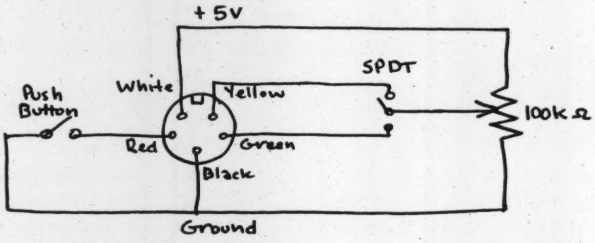


Figure 2. Schematic diagram for one potentiometer replacing one joystick direction. Unused direction is not connected.

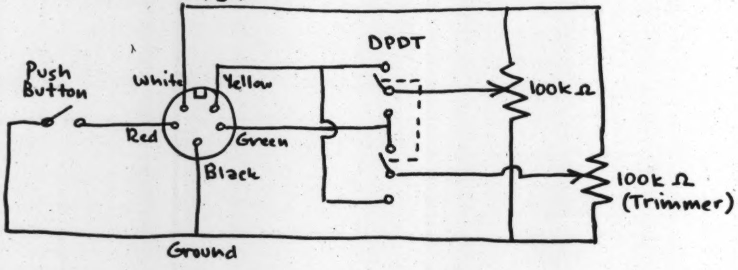


Figure 3. Schematic diagram for replacing joystick with regular and trim potentiometers.

IMAGINE IT...

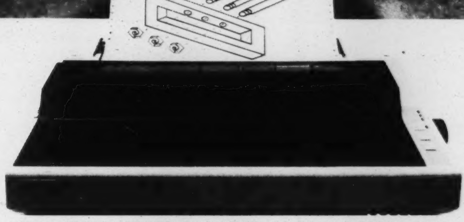
NEW
NOW WITH
DUAL HI-RES GRAPHICS
CAPTURE IT.

Completely Redesigned. Now, the Grappler+.

The original Grappler was the first graphics interface to give you hi-res screen dumps from your keyboard. The new Grappler+ with *Dual Hi-Res Graphics* adds flexibility with a side-by-side printout of page 1 and page 2 graphics.

Interfacing the Grappler+ to a wide range of printers is easy as changing a dip switch. 4K of exclusive firmware makes the Grappler+ the most intelligent, full-featured Apple® Printer Interface made. And, the Grappler+ is Apple III compatible.*

The imitations are many, so insist on the #1 Apple Graphics Interface on the market. Insist on the Grappler+. Available now at most Apple dealers.



ACTUAL APPLE II PRINTOUT USING GRAPPLER AND EPSON MX100

With The Grappler+™ Printer Interface

Grappler+
Printer Interface
COPYRIGHT 1982
Orange Micro

The Grappler+ Features:
• Dual Hi-Res Graphics • Printer Selector Dip Switch • Apple III Compatible* • Graphics Screen Dump • Inverse Graphics • Emphasized Graphics • Double Size Picture • 90° Rotation • Center Graphics • Chart Recorder Mode • Block Graphics • Bell Control • Skip-over-perf • Left and Right Margins • Variable Line Length • Text Screen Dumps.

The Grappler+ works with Pascal and CPM.

The Grappler+ Interfaces with the following printers:
• Anadex • Centronics • Datasouth • Epson** • IDS • NEC • C-Itoh • Okidata**

Orange Micro Inc.

3150 E. La Palma, Suite G
Anaheim, California 92806
(714) 630-3620

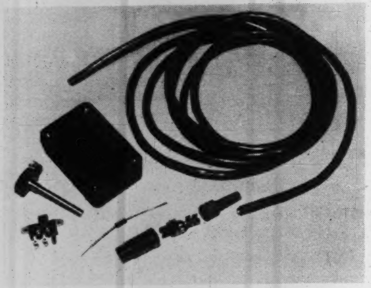
CPM is a registered trademark of Digital Research, Inc.
Apple is a registered trademark of Apple Computer, Inc.

Foreign Dealer Inquiries Welcome TX183511 CSMA

CIRCLE 263 ON READER SERVICE CARD

*Requires additional software driver.
**Requires graphics upgrade.

©Orange Micro, Inc. 1982



Parts for one paddle control: cable, box, potentiometer, slide switch, resistor, disassembled D.I.N. plug.

Building the control is quite simple. Drill three pilot holes in the small plastic "project box," one in each end and one in the center of the top. With larger drills, enlarge the holes for the push button switch and potentiometer until they fit. With a small file, make a rectangular hole in one end for the slide switch. Drill mounting holes and secure the switches and pot.

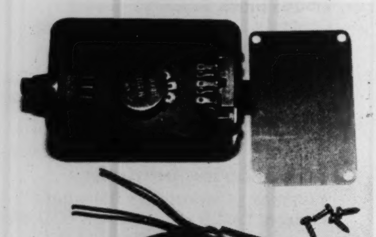
If you are building the more exotic version in Figure 3, mount the trimmer pot on either the right or left side of the box.

Use a knife or rat tail file to notch the box on the side near the slide switch for the cable.

Using short pieces of hook up wire, make all the connections except those from the cable. Then strip about two inches of outside insulation from the cable, strip and tin each wire and make these connections. Be sure to solder all connections securely—no cold solder joints please.

Connect the wires to the potentiometer as shown in Figure 4. This will insure that objects will move on the screen in a direction corresponding to potentiometer rotation.

Attach a small cable clamp to the cable where it exits the side of the box and screw the cover back on.



Push button switch, potentiometer and slide switch are mounted as shown.

Parts List (2 Paddle Controllers)

2	5-pin, 240° D.I.N. male plug
2	5-foot lengths 5-conductor stranded cable
2	100K ohm linear taper potentiometer
2	SPST momentary contact push button switch
2	SPDT slide switch (optional DPDT)
2	Mounting box (1 1/4 x 2 x 2 3/4)
2	1" diameter round knob
2	100K ohm linear taper trimmer potentiometer (optional)
4	6-32 screws and nuts
2	Small cable clamp

Strip about 1 1/2" of outer insulation from the other end of the cable. Strip about 1/16" from each wire. Disassemble the D.I.N. plug. Place the cable sheath over the cable, solder the connectors, and reassemble. Figures 1 to 3 show the D.I.N. connector viewed from the inside (cable side).

Plug in your new joysticks and test them with the following simple program:

```
5  CLS
10 PRINT @0JOYSTK(0)
20 PRINT @8JOYSTK(1)
30 PRINT @16JOYSTK(2)
40 PRINT @24JOYSTK(3)
60 GOTO 10
```

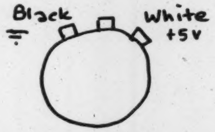
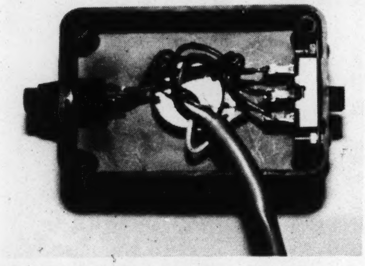


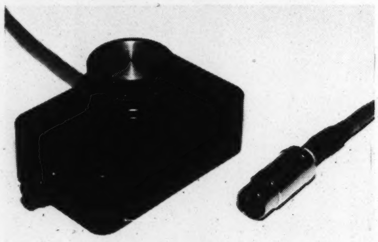
Figure 4. Rear view of potentiometer connections.



Use wires in 5-conductor cable for most internal connections.

JOYSTK 0 and 1 correspond to the right port while 2 and 3 are the left one. The slide switch should allow you to switch the right potentiometer between 0 and 1 and the left between 2 and 3. As you rotate the pot, the screen should show values between 0 and 63. If you built the circuit in Figure 2, the unused direction will generally hover between values 20 to 40. Since the connector is hanging loose and not terminated, this value is undefined.

If everything is working, get out that game of *Invaders* and prepare to rack up the highest score you've ever seen. □

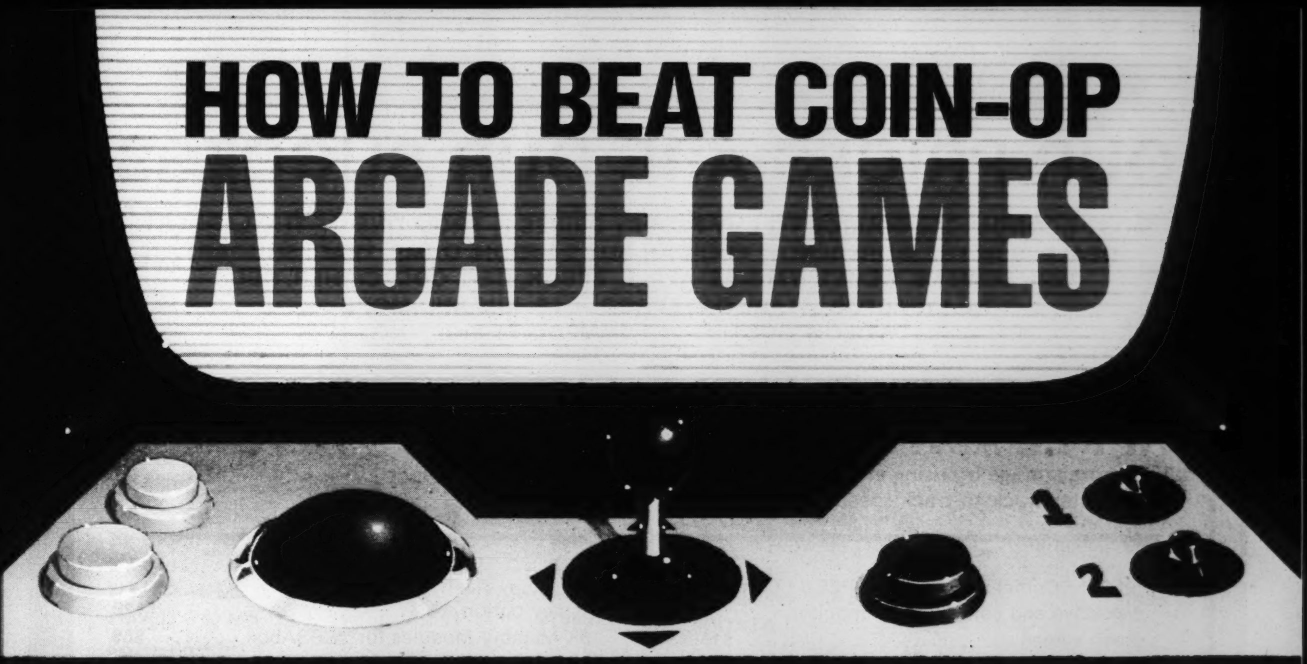


Finished paddle control can be hand held or used on a table top.

JOB SERVICE
B. Boyle

"I used to change channels and open garage doors, but then I was replaced by an enzyme-activated device surgically implanted in the owner's brain."

HOW TO BEAT COIN-OP ARCADE GAMES



GET THE NEW *CREATIVE COMPUTING GUIDE TO THE VIDEO ARCADE GAMES!*

Here's the book coin-op game fanatics have been waiting for! The CREATIVE COMPUTING GUIDE TO THE VIDEO ARCADE GAMES is an all-new, field-tested manual filled with savvy advice and sound tips on how to get the most from all those quarters!

Authors David Lubar and Owen Linzmayer spent thousands of hours playing games, taking notes, and finding the most effective strategies for winning. The result is a player's guide to the 20 most popular games, from Donkey Kong and Pac-Man to Mousetrap and Centipede.

The GUIDE TO THE VIDEO ARCADE GAMES helps beginners avoid being wiped out in seconds, find places to hide, learn how to shoot and move. For advanced players, there's a wealth of hard-won intelligence on exploiting programming oversights to prolong the action and rack up record scores. The detailed illustrations—at least two for each game—will help readers on every level to better understand the action and tactics described.

$3.95
creative computing
GUIDE TO THE
VIDEO
ARCADE
GAMES
DAVID LUBAR
OWEN LINZMAYER

Save money on practice sessions and be the envy of your fellow gameplayers—with the GUIDE TO THE VIDEO ARCADE GAMES. Order your copy today!

ONLY $3.95!

$4\frac{3}{16}'' \times 6\frac{7}{8}''$
Softcover, 112 pages.

For faster service,
PHONE TOLL FREE:
800-631-8112
(In NJ call 201-540-0445)

In the GUIDE TO THE VIDEO ARCADE GAMES, you'll learn about:

- **Collisions,** and how various games deal with them. The differences are important to you.
- **Bonuses,** and why you should be cautious about going for some of them. Many bonuses are real benefits, but others are decoys.
- **Rates of fire,** and how they vary from game to game.
- **Wraparound,** and how to judge exactly where an object will reappear on the screen.
- **Horizontal and vertical motion,** and when to take advantage of diagonal movement.
- **Distractions** and why they are dangerous.
- **Goals,** and why it's important to know what they are for each game.

creative computing Dept. CN26
39 East Hanover Avenue, Morris Plains, NJ 07950

Send me ________ copies of the GUIDE TO THE VIDEO ARCADE GAMES, at $3.95, plus $1 postage and handling,* each. (#14A)

☐ PAYMENT ENCLOSED $____________ (NJ residents add 5% sales tax.)

*All foreign orders (except Canada and Mexico) add $3 to postage and handling shown. Shipped air mail only.

☐ CHARGE MY:
☐ American Express ☐ MasterCard ☐ Visa
(Charge and phone orders: $10 minimum.)

Card No.______________________________ Exp. Date__________

Signature____

Mr./Mrs./Ms.____
(please print full name)

Address_____________________________________ Apt.______

City__________________ State________ Zip______________

Institutions only—purchase orders under $50 not accepted.

OUR PRICES ARE OUR SUCCESS

MOST ECONOMICAL SOURCE TO BUY FLOPPY DRIVES — FROM ONE OF THE LARGEST DEALERS IN THE WORLD! NOW YOU CAN BUY TANDON, QUME, TEAC, SHUGART, MPI, SIEMENS, REMEX, YANKEE, APPLE, EPSON, DEC, CDC, CIPHER, NEC, TALLY, ALTOS, ATARI, DATAPRODUCTS, IBM AND MORE . . .

. . . AT LOW COST!! IMMEDIATE SHIPPING!!

APPLE

100% Apple compatible; runs DOS 3.3, PASCAL, CP/M etc.

15% more storage by using enhancer diskette.

300% faster track-to-track speed.

SAVE $70

SUGGESTED RETAIL PRICE

$329.00

INTRODUCTORY PRICE $259

APPLE II + Complete System: APPLE II + Computer, disk drive and controller 12" monitor green screen	**$1599**
APPLE II + compatible Winchester drives 5 MB . . . **$1795** 10 MB . . . **$1995** Includes controller, cables, software for CP/M, DOS or PASCAL.	
8" drive, controller, power supply, cables, cabinet and software	**$1595**
APPLE Drive 5¼" 70/80 Track	**$389**
Enhancer Diskette 35 TD 40 Tracks	**$389**
APPLE II plus 64K, Z80 card, 80 column card, controller hardware diagnostic, DOS 3.3, disk drive 163K, green monitor — runs DOS 3.3, CP/M and PASCAL	**$1950**

OTHER PRODUCTS FOR APPLE II

Description	Sale Price
VERSAcard-multifunction board	**$169**
BSR Transducer	**$19**
Applications/Demo Disk	**$25**
Parallel Printer Card	**$69**
PRT-1 with cable	**$75**
PRT-1 with EPSON 80/100 screen graphics dump with cable -Graffitti card-	**$99**
PRT-1 with NEC8023 or C-10th PROWRITER screen Dump Graphics	**$99**
16K ram card	**$89**
32K ram card	**$175**
64K ram card including DOS 3.3 disk emulator	**$279**
128K ram card including DOS 3.3 disk emulator	**$369**
PASCAL disk emulator	**$39**
DOS 3.3 disk emulator	**$39**
Visicalc Expand Program	**$59**
VERSAbox Spooler/buffer 16K Centronics Input/Output	**$199**
VERSAbox Spooler/buffer 16K Centronics and RS232C	**$239**
VERSAbox Real Time Clock/ Display option	**$129**
16K Memory Modules for VERSAbox	**$39**
Standard 6' Centronics Parallel Cable for EPSON, C-ITOH, NEC, ANADEX, and others	**$22**
Standard 6' Paper Tiger or Prism Printer cable. Parallel Centronics Male DB25	**$26**
Miscellaneous cables for various printers. Please specify for Qume, Diable, Votrax NEC Spinwriter or other	**$26**
80 Column card	**$169**
Z80 card (no CP/M software included)	**$149**
Controller for Apple II including hardware diagnostics	**$95**

IBM

PC with 256K memory, disk drive controller, 2 drives and a green 12" monitor	**$2799**
Floppy drive controller	**$189**
Controller with one serial interface	**$249**
Board with one parallel and two serial interface (no controller)	**$249**
Big Blue Card (multifunction card)	**$489**
Single side single density drive 5¼"	**$195**
Double side double density drive 5¼"	**$249**
Tandon TM 100-1 5¼" SS SD drive 250 KB capacity	**$208**
Tandon TM 100-2 5¼" DS DD drive 500 KB capacity	**$269**
Tandon TM 100-4 5¼" 96 TPI drive IMB capacity	**$379**

MEMORY:

64K — **$189** 128K — **$289**
256K — **$499** 512K — **$799**

★ **APPLE COMPATIBLE COMPUTERS BASIS & FRANKLIN AVAILABLE** ★

COMPUSHACK

ATARI

800 ATARI computer and disk drive	**$1099**
400 ATARI computer and disk drive	**$799**
Double side double density drive	**$649**
Add on drive	**$399**
VIC 20	**$299**
NEC computer PC8000	call
Xerox computer 820	call

DISK DRIVES

TANDON:

TM 100-1	**$208**
TM 100-2	**$269**
TM 100-4	**$379**
TM 848-1	**$399**
TM 848-2	**$499**
TM 602 - 5 MB	**$899**
TM 603 - 10 MB	**$1049**

SHUGART:

SA 400	**$215**
450	**$281**
800/801	**$379**
850	**$535**

SIEMENS:

FDD 100-5	**$199**
200-5	**$259**
100-8	**$349**
200-8	**$449**

QUME:

DT-5	**$279**
DT-8	**474**

TEAC:

FD50A	**$199**
FD50B	**$299**
FD50E	**$299**
FD50F	**$399**

CABINETS/POWER SUPPLY

Dual 8" disk drive cabinet with power supply	**$249**
Cabinet/power supply for single 8" drive	**$179**
Dual 5¼" disk drive cabinet with power supply	**$99**
Single 5¼" disk drive cabinet with power supply	**$69**
2 single side double density 8" disk drives, cabinet/power supply	**$895**

MONITORS & PRINTERS

NEC 12" green	**$169**
BMC 12" green	**$95**
BMC 12" green (high res.)	**$149**
BMC 13" color monitor	**$289**
C. ITOH Prowriter parallel	**$499**
C. ITOH Prowriter serial	**$599**
C. ITOH Prowriter 15" carriage ... Parallel	**$699**
Serial	**$799**
F10 Daiseywheel letter quality	**$1495**

OKIDATA

82A	**$459**	83A	**$730**
84AP	**$999**	84AS	**$1099**

EPSON

		MX-80	**$469**
MX-80 FT	**$539**	MX-100	**$699**

BROTHER HR1	**$799**
SMITH CORONA TP1	**$599**

ATTACHE:

The 18-pound portable, compact turn key computer system, by OTRONA contains: Z80A processor, DMA processor, 2 double size double density drives, high resolution graphics, built-in diagnostics, CP/M, Wordstar plus, Basic 80, Valet, and other items included. DC operator and battery backup. Multifunction expansion (optional) **$3999**

Soon Opening Retail Stores Throughout U.S.A.
FRANCISE INQUIRIES WELCOME

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

ALL FLOPPIES
REPAIRED QUICKLY
AT LOW COST

24-HOUR ORDERING SERVICE
TOLL-FREE TELEPHONE NUMBERS
Outside California: 800-854-8428
Inside California: (714) 730-7207 or (408) 973-1444
Telex: 18-3511 Answer Back CSMA

COMPUSHACK
Computers - Video Games

2630-H Walnut Avenue
Tustin, CA 92680

CIRCLE 140 ON READER SERVICE CARD

RanaSystems

Your Apple computer can grow from ordinary to awesome in a matter of minutes.

The Elite disk drive Series by Rana Systems *gives* you that kind of magic. Quickly, easily and cost-effectively.

This superb family of sophisticated floppy drives was designed and perfected by a team of industry-respected engineers expressly for Apple® computer owners who have long been demanding more disk drive for their money.

Now they *have* a drive that makes an Apple perform the way it should. For example;

Elite One, the most economical Rana drive, delivers 15% more storage capacity than Apple's drive. The top-of-the-line Elite Three will provide an astonishing *four-times* more storage, approaching hard disk performance. It's done through exclusive high-density single and double-sided disks and heads.

APPLEWRITER* EXTENDED
additional capabilities

80 COLUMN VIDEO CARDS

LOWER CASE ADAPTERS

CP/M
Fortran
Pascal

Voice Entry

free catalog

Microsoft Z-80 Softcard
Microsoft 16K Ramcard
Videx Videoterm

APPLE SOFTWARE
APPLE ACCESSORIES

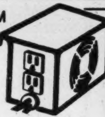
CALL TOLL FREE

For specific software not listed, CALL 1-800-368-2260

Gold Disk™

Tel. 1-800-368-2260
VISA/MC/Check/M.O.
Free BASF disk

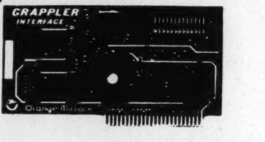
Attach SYSTEM
SAVER
to your
Apple II



FREE DATA DISK WITH EVERY $49 WORTH OF PURCHASE!

INTERFACE CARDS

The Grappler
Apple Graphics Interface



The most intelligent Apple Interface available. EPROM chip makes high-resolution graphics easy. Versions to accommodate the Anadex, Epson Series*, IDS Paper Tigers, Centronics 739, NEC 8023, C. Itoh Prowriter, Okidata Series* and more.

*Requires Graphics Upgrade.

The MICROMODEM II is a complete communication system for the Apple II. It can transmit over the telephone lines data between your Apple and other computers anywhere in North America. In addition the Apple can be used as a remote terminal to another computer. The possibilities are endless.

HAYES MODEMS

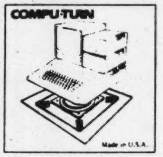
MICROMODEM II

Type-and Talk
Video Digitizers
Bar Code Readers
Card Readers
Game Controls
Graphics Tablet
Music System
Numeric Keypads
Programming Aid

TG Products
JOYSTICK

Introducing COMPU-TURN a turn-table platform that enables you to rotate your personal computer, disk-drives, and monitor to any position you desire. By simply placing COMPU-TURN under your computer it puts the keyboard at your fingertips and directs the monitor for easy viewing. COMPU-TURN helps you get the most out of your personal computer by reducing eyestrain or clumsy reaching due to an ill positioned unit. Let your system follow you wherever you go, with COMPU-TURN.

And when the work is over COMPU-TURN also creates easier game playing situations for the family when using game controllers or paddles.

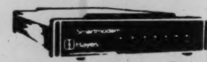


FEATURES:

- 1/8" solid black plexiglass
- Heavy duty ball-bearing mechanism
- Highest quality construction
- 12" x 14" top platter (accepts Apple, 2 disk-drives & monitor)
- 9" x 9" bottom platter for stable installation
- Non-skid, non-scratch soft rubber foot pads
- No assembly required.

ONLY $39.95
Suggested retail price

Smartmodem



- Auto-Answer • Auto-Dial • Repeat
- Programmable · Use Any Language
- Touch-Tone and Pulse Dialing
- Audio Monitor · Listen to Connection
- FCC-Approved Direct-Connect
- Full or Half Duplex. 0-300 Baud
- RS-232C Interface • 7 Status LED's
- Two Year Limited Warranty

The PKASO Interface
Gray scale printing
Snapshot screen dump
support for the Apple Z-80 CP/M
Apple /// compatibility

The master PKASO
printer interface
at a very low cost

Corvus
SOFTWARE

The EXECUTIVE SECRETARY

All the usual word processor functions
40 or 80 columns · selectable
Real shift key without soldering
Full format control
Full forms handling
Keyboard input at print time
Supports any printer
Built-in Card File w/Report Generator
Access to external databases, such as Data Factory and others
Built-in Electronic Mail

No Credit Card Penalty

GOLD DISK™ Software
Box 102
Glen Arm, Md. 21057
TOLL FREE 1-800-368-2260

END OF SUMMER
SPECIAL DISCOUNT
FOR ALL STUDENTS
AND PARENTS OF STUDENTS!

1-800-368-2260 (In Maryland, Call 592-5949) *APPLE IS A TRADEMARK OF APPLE COMPUTER INC.

CIRCLE 180 ON READER SERVICE CARD

DON'T BUY SOFTWARE THAT'S LOCKED UP!

Beagle Bros
MICRO SOFTWARE

All Beagle Bros Apple Utilities are BACKUP-ABLE, LISTABLE, CUSTOMIZABLE and fully compatible with normal Apple DOS.

APPLE MECHANIC
SHAPE WRITER/ZAP UTILITY
by Bert Kersey

SHAPE EDITOR: Add professional hi-res animation to your programs. Design shapes & custom type characters, automatically written into shape tables. Many type fonts on disk & listable demo programs showing how to use shape tables for games & impressive hi-res CHARTS & GRAPHS. A valuable time-saving utility and Apple learning tool.

BYTE ZAP: A MUST utility. Rewrite any byte on a disk. Optional Hex/Decimal/Ascii display and input. Create illegal file names. Restore deleted files. Inspect, repair and protect disks. Change DOS. Clear illustrated instructions show how data is stored and how to access it.

MORE: A disk PACKED with useful music, text & hi-res tricks for use in YOUR PROGRAMS.

$29.50 Includes Apple Tip Book #5 and Peeks & Pokes Chart

UTILITY CITY
21 UTILITIES ON ONE DISK
by Bert Kersey

LIST FORMATTER makes custom listings with page breaks; each statement on new line, if-then's called out and loops indented. MULTI-COLUMN CATALOG in any page-width. Put invisible commands in programs. Alphabetize & store info. Make trick & invisible file names. Append programs. Convert hex. Dump text to printer. Auto-post Run Number/Date in programs...More: 21 LISTABLE PROGRAMS Total!

$29.50 Includes Apple Tip Book #3 and Peeks & Pokes Chart

DOS BOSS
DISK COMMAND EDITOR
by Bert Kersey & Jack Cassidy

A classic utility you will ENJOY. Rename commands/error messages. PROTECT PROGRAMS (unauthorized save-attempt produces "Not Copyable" message). LIST-PREVENTION too. One-key program-run from catalog. Change Disk Volume heading to your title with or without volume number. Fascinating documentation. Hours of good reading & experiments.

All changes may be appended to your programs, so that anyone using your disks (booted or not) will be using DOS the way YOU formatted it.

$24.00 Includes Apple Tip Book #2 and Peeks & Pokes Chart

TIP DISK #1

100 programs from Beagle Bros Tip Books 1, 2, 3 & 4— Hi-Res/Lo-Res/Text/Sound. All listable, copyable and changeable; each teaches another fascinating Apple programming trick!

Note: No Tip Book with Tip Disk #1.

$20.00 With Peeks & Pokes Chart

ALPHA PLOT
HI-RES GRAPHICS/TEXT UTILITY
by Bert Kersey & Jack Cassidy

HI-RES DRAWING: Create pictures and charts on both hi-res pages; all appendable to YOUR PROGRAMS. Relocate any portion of a picture. Compress hi-res; store images in 1/3 DISK SPACE. Superimpose images too.

HI-RES TEXT: Upper/lower case with descenders. PROPORTIONAL SPACING. No tab limitations. Adjustable letter height, spacing & color. Multi-directional typing for graphs.

$39.50 Includes Apple Tip Book #4 and Peeks & Pokes Chart

GOTO your Apple Dealer.

Most Apple Dealers carry our software. If yours doesn't, he can have it in his store for you within just a few days through **Beagle Bros** or **Softsel.**

Or Order by Phone:
24-hour TOLL-FREE Order Desk:
Visa/MasterCard/COD* Orders, call

Nationwide: **800-854-2003** ext.827
California: **800-522-1500** ext.827
Alaska/Hawaii: **800-854-2622** ext.827

(ORDERS ONLY PLEASE) *COD, add $3.00

EACH DISK Includes Our famous 11x17 PEEKS & POKES Chart and a different Apple Tip Book, each one a Gold Mine of juicy Apple info!

Or Mail us a check:
(or Visa/MC No. & Exp. Date)

☐ **Alpha Plot** ☐ **Utility City**
☐ **Dos Boss** ☐ **Apple Mechanic**
☐ **Tip Disk** ☐ **Game Pack 1-4**

Add $1.50 shipping (on any size order) and 6% tax if California. MAIL TO—

BEAGLE BROS, Dept.C
4315 Sierra Vista
San Diego, Ca 92103

Please add $4.00 if outside North America.

CIRCLE 121 ON READER SERVICE CARD

Computer Art for the Tektronix 4052

Joe Jacobson

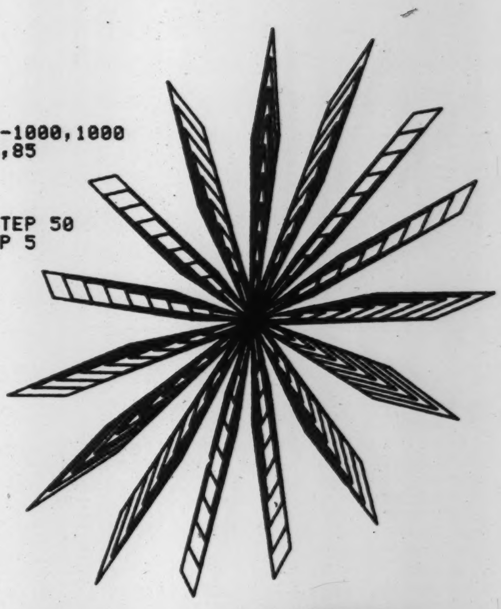
These pictures were generated on a Tektronix 4052 intelligent terminal. This device, when used in stand-alone mode, functions as a microcomputer not unlike most home computers. The main differences are that the CRT is a storage tube, screen resolution is very high, and you can easily obtain hardcopies of anything that is displayed on the screen.

The programs that were used are coded in Basic. However, the plotting commands (MOVE, WRITE, WINDOW, VIEWPORT), which are typical of graphics packages plot statements, are not standard Basic commands.

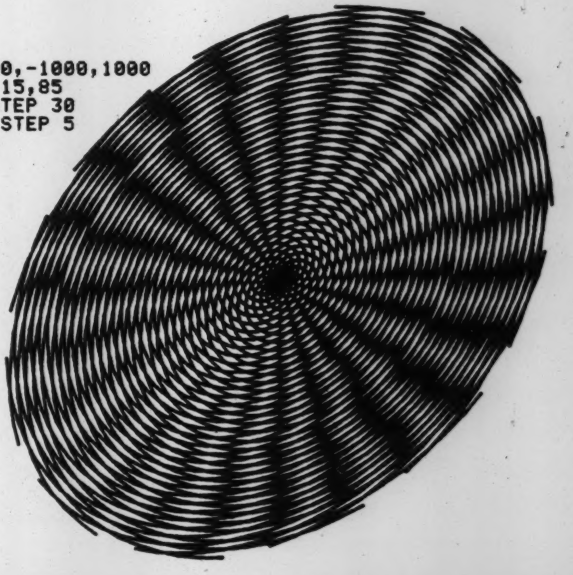
The program listings are reproduced here. However, you will not be able to make these pictures on your home computer unless you have either a mechanical plotter or high enough CRT graphics resolution to draw thin lines. As home computers evolve and improve, more and more people will acquire systems wth good graphics capability and computer art will flourish at the grass roots level. For now, I hope you like my pictures. ☐

Joe Jacobson, 675 E. Street Rd., Apt. 1009, Warminster, PA 18974.

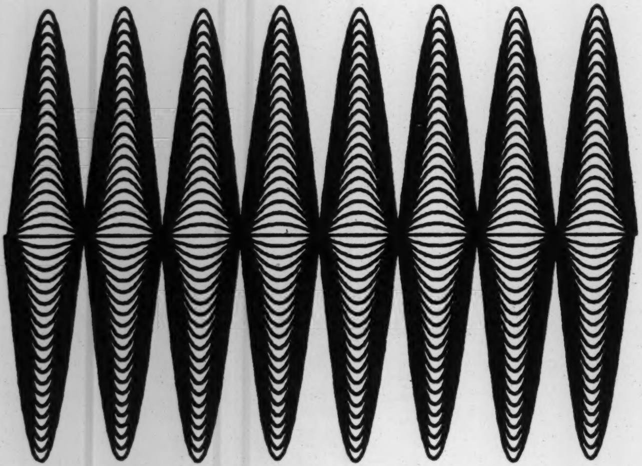
```
89 REM NOVA
100 PAGE
109 SET DEGREES
110 WINDOW -1000,1000,-1000,1000
111 VIEWPORT 20,110,15,85
112 PAGE
114 L=15
115 PAGE
120 FOR B=100 TO 500 STEP 50
130 FOR A=0 TO 360 STEP 5
140 GOSUB 180
145 IF A>0 THEN 150
146 MOVE X,Y
147 GO TO 160
150 DRAW X,Y
160 NEXT A
170 NEXT B
180 R=B*(1-SIN(L*A))
190 X=R*COS(A)
200 Y=R*SIN(A)
210 RETURN
220 END
```

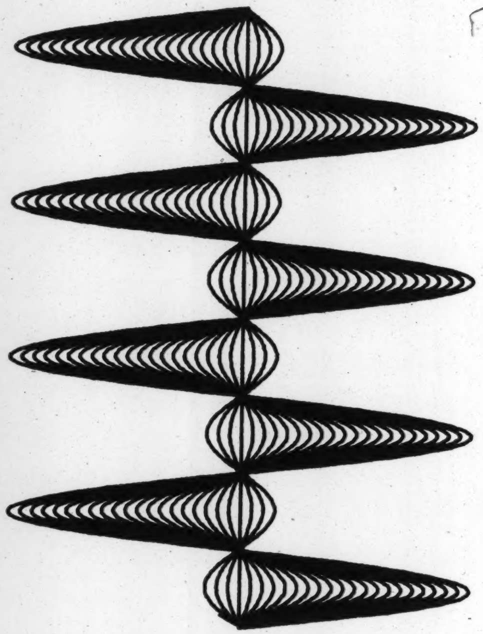


```
89 REM CURLICUE MOIRE
90 PAGE
103 B=1
105 SET DEGREES
106 PAGE
107 K=0
110 WINDOW -1000,1000,-1000,1000
111 VIEWPORT 20,110,15,85
120 FOR C=0 TO 330 STEP 30
130 FOR X=0 TO 1000 STEP 5
131 IF K=0 THEN 140
132 IF K>1 THEN 190
133 U=-X*COS(X-C)
134 GO TO 150
140 U=X*COS(X-C)
150 V=X*SIN(X-C)
155 IF X>0 THEN 160
156 MOVE U,V
157 GO TO 170
160 DRAW U,V
170 NEXT X
180 NEXT C
181 IF B=1 THEN 183
182 GO TO 190
183 K=K+1
184 GO TO 120
190 END
```

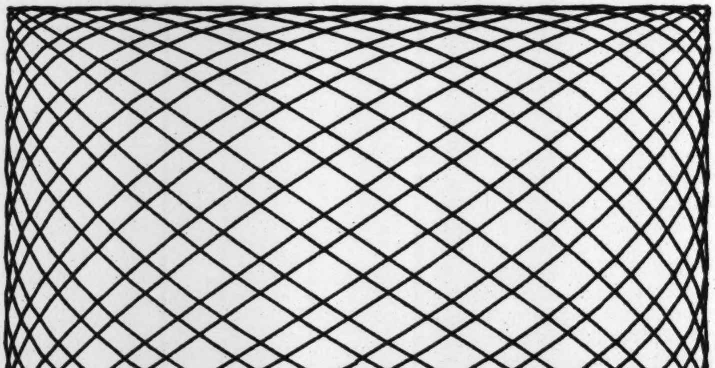


```
100 REM STANDING WAVES
101 PRINT "B IS THE INITIAL AMPLITUDE; USE B=-10 OR B=0.5"
102 PRINT "ENTER B"
103 INPUT B
105 SET DEGREES
106 WINDOW 0,1440,-10,10
107 VIEWPORT 20,110,15,85
110 PAGE
117 FOR A=B TO 10 STEP 0.5
119 MOVE 0,0
120 FOR X=0 TO 1440 STEP 5
130 Y=A*SIN(X)
140 DRAW X,Y
150 NEXT X
160 IF A=>10 THEN 170
165 NEXT A
170 END
```





```
90 REM LISSAJOUS
100 PAGE
101 PRINT "THIS PROGRAM MAKES OSCILLOSCOPE-TYPE PATTERNS. TO SEE"
102 PRINT "WHAT EACH PARAMETER REPRESENTS, REFER TO A LISTING OF THE"
103 PRINT "PROGRAM. A DECENT SAMPLE OUTPUT IS GIVEN BY:"
104 PRINT "(J,M,P1,K,N)=(20,16,0,0,0) AND"
105 PRINT "(I,G,P2,H,L)=(20,17,35,0,0) AND D=.5"
106 PRINT "TO START THE PROGRAM, HIT CARRIAGE RETURN."
107 INPUT A$
110 PAGE
120 PRINT "ENTER X PARAMETERS: J,M,P1,K,N.    ";
125 INPUT J,M,P1,K,N
126 PAGE
130 PRINT "ENTER Y PARAMETERS:I,G,P2,H,L.   ";
131 INPUT I,G,P2,H,L
134 PAGE
135 PRINT "ENTER D.    ";
136 INPUT D
140 PAGE
150 SET DEGREES
160 A=0
170 X=J*SIN(M*A+P1)+K*COS(N*A)+65
180 Y=I*SIN(G*A+P2)+H*COS(L*A)+50
190 IF A>0 THEN 220
200 MOVE X,Y
210 GO TO 230
220 DRAW X,Y
230 IF A<360 THEN 250
240 END
250 A=A+D
260 GO TO 170
```



IF YOU'RE WAITING FOR THE PRICE OF WORD PROCESSORS TO FALL WITHIN REASON,

IT JUST DID.
commodore
CBM
Model 8032
WordPro 4 PLUS
OFFICIALLY APPROVED COMMODORE DEALER

Everyone expected it would happen sooner or later...with WordPro PLUS™ it already has! Now all the marvelous benefits of expensive and advanced word processing systems are available on Commodore computers, America's largest selling computer line. WordPro PLUS, when combined with the new 80 column CBM 8032, creates a word processing system comparable to virtually any other top quality word processor available—but at savings of thousands of dollars!

New, low cost computer technology is now available at a fraction of what you would expect to pay. This technology allowed Commodore to introduce the new and revolutionary CBM 8032 Computer.

WordPro PLUS turns this new CBM 8032 Computer into a sophisticated, time saving word processing tool. With WordPro PLUS, documents are displayed on the computer's screen. Editing and last minute revisions are simple and easy. No more lengthy re-typing sessions. Letters and documents are easily re-called from memory storage for editing or printing with final drafts printed perfectly at over five hundred words per minute!

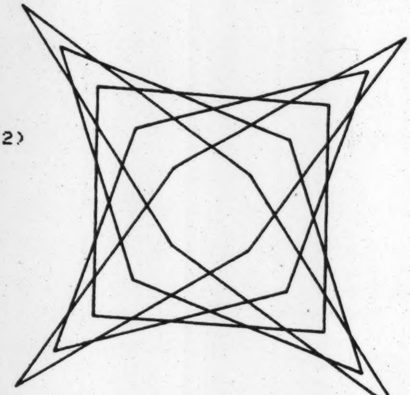
Our nationwide team of professional dealers will show you how your office will benefit by using WordPro PLUS. At a price far less than you realize.

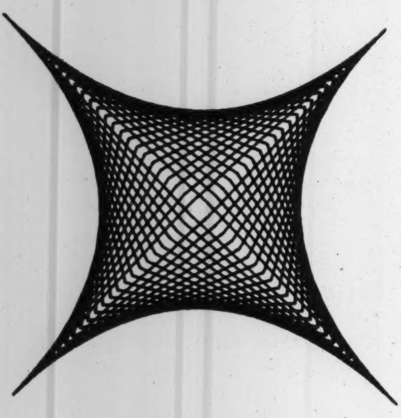
Invest in your office's future...
Invest in WordPro PLUS...
Call us today for the name of the WordPro PLUS dealer nearest you.

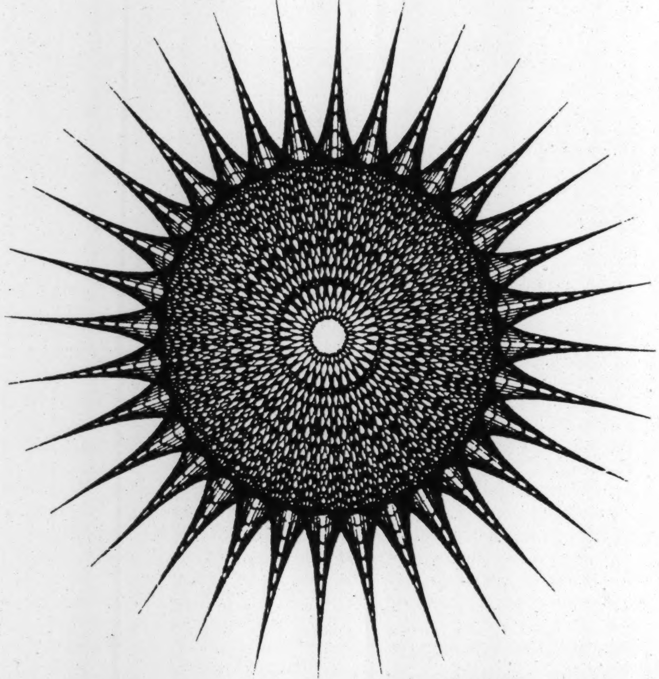
Professional Software Inc.
166 Crescent Road
Needham, MA 02194
(617) 444-5224
TELEX: 95 1579

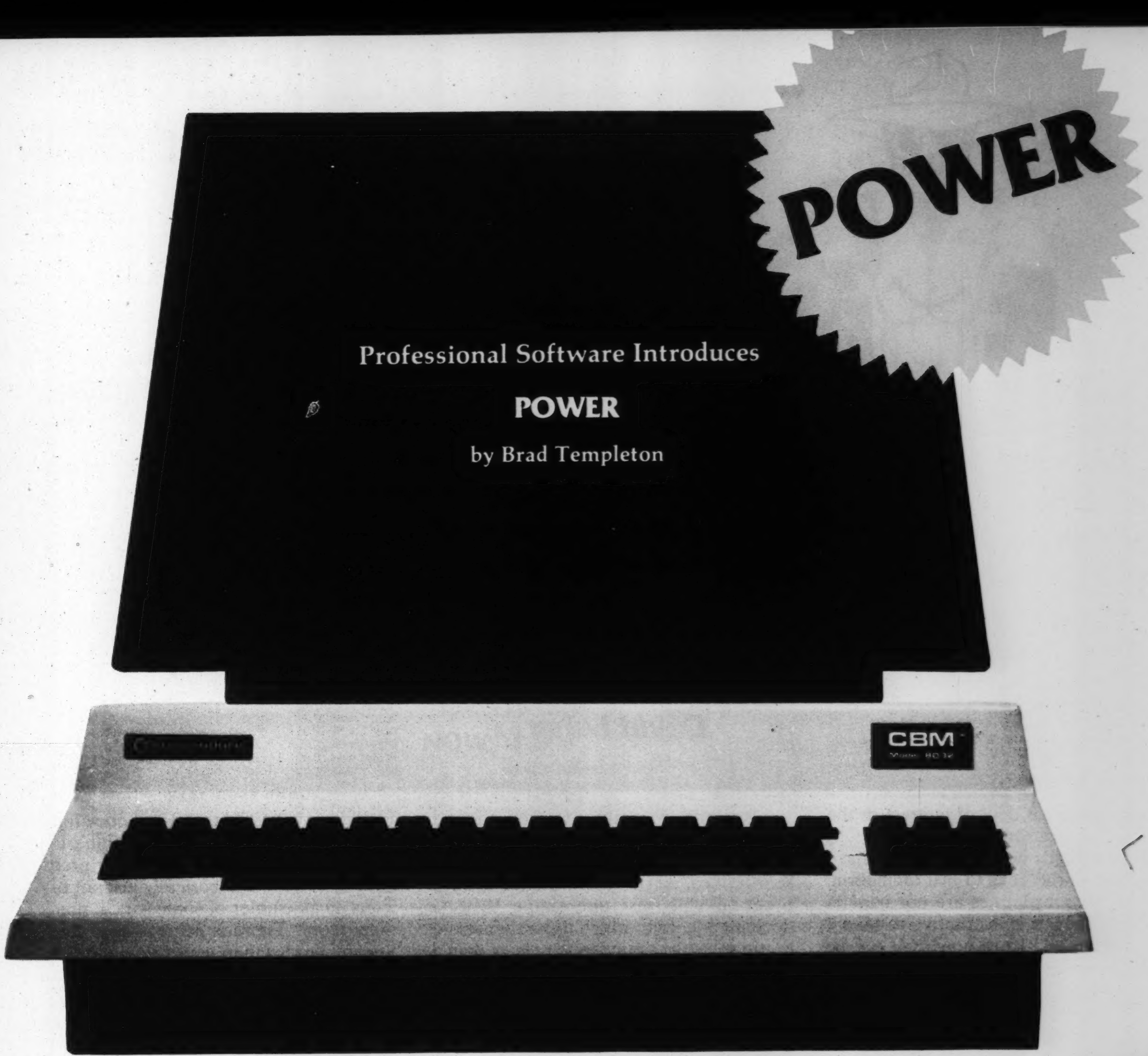
CIRCLE 250 ON READER SERVICE CARD

```
90 REM CONNECTED WEB
100 PAGE
101 PRINT "THIS PROGRAM,CONNECTED WEB, WAS DEVELOPED AND CODED BY"
102 PRINT "JOE JACOBSON, AND IS BASED ON A SUGGESTION BY CHRIS"
103 PRINT "KUEBLER. PARAMETER N GIVES THE # OF VERTICES. P GIVES THE"
104 PRINT "# OF IMAGINARY TIC MARKS ON EACH VERTEX AXIS. A0 IS THE"
105 PRINT "INITIAL ROTATION ANGLE. R0 IS THE OVERALL RADIUS. THE"
106 PRINT "OVERLAY ENHANCES THE PICTURE. FOR EXAMPLE, TRY:"
107 PRINT "(N,P,A0,R0)=(16,20,0,50) AND REQUEST AN OVERLAY WHEN ASKED."
108 PRINT "THIS GIVES A FAIRLY NEAT PATTERN."
109 PRINT "TO START THE PROCESS, HIT CARRIAGE RETURN."
110 INPUT A$
111 PAGE
112 SET DEGREES
113 PRINT "ENTER N,P,A0,R0."
120 INPUT N,P,A0,R0
122 PAGE
123 PRINT "ENTER 1 FOR SINGLE PATTERN, 2 FOR OVERLAY."
124 INPUT K
125 PAGE
130 D=R0/P
140 A9=360/N
145 L=1
150 I=0
160 J=0
170 A=A0+J*A9
180 R=((P-I)*(1--1↑J)+(I+1)*(1--1↑(J+1)))*(D/2)
190 X=65+R*COS(A)
200 Y=50+R*SIN(A)
210 IF J=0 THEN 240
220 DRAW X,Y
230 GO TO 250
240 MOVE X,Y
250 IF J=N THEN 280
260 J=J+1
270 GO TO 170
280 IF I=P-1 THEN 310
290 I=I+1
300 GO TO 160
310 IF K=2 THEN 322
320 END
322 IF L=1 THEN 330
323 GO TO 320
330 A0=A0+A9/2
340 L=2
350 GO TO 150
```









ADD POWER TO YOUR COMMODORE COMPUTER

$89.95

POWER produces a dramatic improvement in the ease of editing BASIC on Commodore's computers. POWER is a programmer's utility package (in a 4K ROM) that contains a series of new commands and utilities which are added to the Screen Editor and the BASIC Interpreter. Designed for the CBM BASIC user, POWER contains special editing, programming, and software debugging tools not found in any other microcomputer BASIC. POWER is easy to use and is sold complete with a full operator's manual written by Jim Butterfield.

POWER's special keyboard 'instant action' features and additional commands make up for, and go beyond the limitations of CBM BASIC. The added features include auto line numbering, tracing, single stepping through programs, line renumbering, and definition of keys as BASIC keywords. POWER even includes new "stick-on" keycap labels. The cursor movement keys are enhanced by the addition of auto-repeat and text searching functions are added to help ease program modification. Cursor UP and cursor DOWN produce **previous** and next lines of source code. COMPLETE BASIC program listings in memory can be displayed on the screen and scrolled in either direction. POWER is a must for every serious CBM user.

Call us today, for the name of the Professional Software dealer nearest you.

Professional Software Inc.
166 Crescent Road
Needham, MA 02194
Tel: (617) 444-5224 Telex #951579

CIRCLE 249 ON READER SERVICE CARD

The Graph Paper

Part Five: ROM Routines

David Lubar

There is a great deal of interest in the internal graphics routines found in ROM Applesoft, mostly because people believe this is one of the keys to fast animation. While these subroutines are not used in modern games, it is instructive to take a look at them and learn how they can be accessed by user programs. The majority of this article will be devoted to these routines and ways to access them.

Dedication

First, what are ROM routines? Whenever you give a command from Basic, the Apple must contain subroutines to carry out your wishes. When you type in PRINT "HELLO," the Apple calls a subroutine which contains machine language instructions that put text on the screen. These routines are found in the Applesoft ROM and in the system monitor.

Likewise, any graphics command, such as HPLOT 20,20, is carried out by a subroutine in ROM. The computer passes parameters to the subroutine. A programmer can do the same thing, thus bypassing Basic. In part, you are taking the role of a Basic interpreter. You know what you want done, and you know which routine will do it. So you skip over Basic.

This results in faster code, since the program is in machine language. But two factors prevent this method from being ideal. First, as mentioned before, the ROM routines are not super efficient. They had to be written in a limited amount of space, and thus often sacrifice speed of execution for compactness.

Also, the routines are generalized instead of being dedicated. For instance, all shapes are drawn with one set of subroutines. But if you were to write a program with just one shape in it, a dedicated routine which drew that shape at top speed would be much faster than a general shape-drawing routine. We'll see examples of dedicated routines in later articles.

While the intent of this series is not to provide a tutorial on assembly language, I want to digress slightly into that area to allow those not familiar with assembler to use the following material. If you are already familiar with assembly language, skip the next section.

Talking in Numbers

Strictly speaking, the terms "assembly language" and "machine language" have different meanings. Assembly language is written using mnemonics. These are short "words" that represent commands. The mnemonic for jumping to a subroutine is JSR, while that for returning from the subroutine is RTS. Code written on an assembler is a combination of mnemonics, addresses, numbers, and, in most cases, labels. Programs published in magazines take this form.

When the code is assembled, it becomes machine language. Machine language consists entirely of numbers. Where the programmer has written JSR $6000, the assembled code would be 20 00 60. This final product is the actual machine language program.

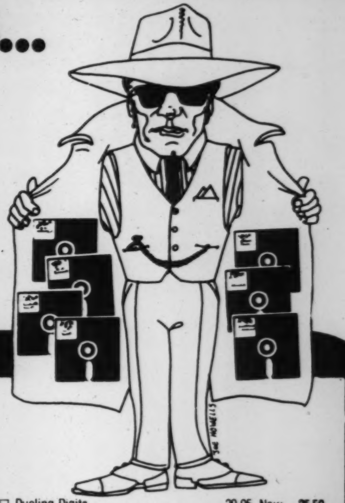
While it is possible, and was once fairly common, to write code in machine language, the process is tedious, error prone, hard to modify, and basically just not fun. Thus an assembler of some sort is almost mandatory. There is no reason to make life any harder than necessary, and there is no special glory to be found in hand coding.

If you have an Apple with Integer ROMs, you already have a mini assembler. It accepts mnemonics, but doesn't allow labels. In other words, it will accept JSR $6000, but won't understand JSR DRAW. There are many assemblers on the market, and the argument over which is best is approached with religious fervor. I won't proselytize, but I will mention that I am presently using Merlin at work and find it excellent for short programs.

At home, since my system doesn't have a language card, I am using TED II. Some of my co-workers use EDASSEM from the DOS toolkit while others swear by Lisa. Each assembler has strong points and weaknesses, and personal preference seems to be based mostly on which one a person first learned to use.

There are two main ways to enter the programs that will be listed in this and future articles. If you have an assembler, you can just type in the labels, operators and operands as listed. If you have no assembler, the machine code in the second, third and fourth columns (the first column shows the memory location of the code) can be entered directly into the monitor.

WE'RE EXPOSING OURSELVES...
With these shamelessly low prices on apple® Software!



GREAT SERVICE
GREAT PRICES
WHAT ELSE YOU
WANT?

micro mountain

OVER 1,000 ITEMS IN STOCK — STOCK ITEMS SHIPPED SAME DAY — ASK FOR FREE CATALOG

HARDWARE SPECIALS

☐ Smarterm 80 Column board	345.00	Now	289.50
☐ Z-Card (Z-80, CP/M)	279.00	Now	239.50
☐ ALF 9-Voice Card w/Software	199.50	Now	179.50
☐ Low Res Color Monitor	449.00	Now	389.50
☐ RGB Color II Interface	199.00	Now	169.50
☐ Dana Cooling Fan	49.95	Now	42.50
☐ Elephant Diskettes (Box of 10)	39.95	Now	24.50
☐ Hand Controller (Paddles)	29.95	Now	28.50
☐ Numeric Keypad	149.50	Now	139.50
☐ Z-80 Softcard with CP/M	399.95	Now	299.50
☐ CPS Multifunction Card	239.95	Now	189.50
☐ Music System	395.00	Now	339.50
☐ NEC 12" Hi-Res Green Monitor	285.00	Now	189.50
☐ The Grappler (Specify printer)	149.95	Now	139.50
☐ 16k Ramcard	195.00	Now	119.50
☐ Game Paddles	39.95	Now	32.50
☐ Joystick	59.95	Now	49.50
☐ Expand-a-Port	59.95	Now	49.50
☐ Thunderclock Plus	139.00	Now	129.50
☐ Station II	129.95	Now	119.50

UTILITY PROGRAM SPECIALS

☐ Hi-Res Secrets	124.95	Now	99.50
☐ Dos Boss	24.00	Now	21.50
☐ Utility City	29.50	Now	25.50
☐ Alpha Plot	39.50	Now	34.50
☐ Tip Disk #1	20.00	Now	17.50
☐ 3-D Graphics System	39.95	Now	34.50
☐ Home Money Minder	34.95	Now	29.50
☐ Home Accountant	74.95	Now	64.50
☐ TASC Compiler	175.00	Now	152.50
☐ The Voice	39.95	Now	34.50
☐ Master Diagnostics	50.00	Now	45.50
☐ The Locksmith	99.95	Now	86.50
☐ Lisa Assem. Lang. Dev. Sys.	79.95	Now	69.50
☐ Expediter II	99.95	Now	87.50
☐ The Manipulator	34.95	Now	29.50

DYNOMITE DEAL #1

Kensington Microware
SYSTEM SAVER
REGULAR $89.95
NOW $69.50

☐ Graphics Magician	59.95	Now	52.50
☐ Special Effects	39.95	Now	33.50
☐ Super Disc Copy	30.00	Now	25.50
☐ Disk Recovery (The Scanner)	30.00	Now	25.50
☐ Dos Plus	25.00	Now	21.50
☐ Back It Up (Nibble Copier)	59.95	Now	52.50
☐ Original Quick Loader	24.95	Now	21.50
☐ E-Z Draw 3.3	49.95	Now	39.50
☐ Data Capture 4.0/80 (Videx)	89.95	Now	75.50
☐ ASCII Express	64.95	Now	61.50
☐ Z-Term (Req CP/M	99.95	Now	92.50
☐ Z-Term Professional (Req CP/M)	149.95	Now	125.50
☐ Speed Star	134.95	Now	119.50
☐ A2-3D Graphics Package	59.95	Now	52.50
☐ Program Line Editor	40.00	Now	32.50
☐ Higher Graphics II	35.50	Now	27.50

EDUCATIONAL PROGRAM SPECIALS

☐ Auto Atlas	47.50	Now	41.50
☐ Compu-Math Arithmetic	49.95	Now	39.50
☐ Compu-Math Fractions	39.95	Now	33.50
☐ Compu-Math Decimals	39.95	Now	33.50
☐ Algebra 1	39.95	Now	33.50
☐ Statistics 3.0	29.95	Now	25.50
☐ Spelling Bee w/Reading primer	39.95	Now	34.50
☐ Counting Bee	29.95	Now	24.50
☐ Pythagoras and the Dragon	39.95	Now	35.50
☐ Isaac Newton, Fig Newton	49.95	Now	43.50
☐ Master Type	39.95	Now	34.50
☐ Englash SAT #1	30.00	Now	26.50
☐ U.S. Constitution Tutor	30.00	Now	26.50
☐ Typing Tutor II	24.95	Now	22.50
☐ Division Skills	44.95	Now	39.50
☐ Mixed Numbers	44.95	Now	39.50
☐ Vocabulary (Preifx, Suffix, Roots)	44.95	Now	39.50
☐ Punctuation (Commas)	44.95	Now	39.50
☐ Elementary Math Edu-Disk	39.95	Now	36.50
☐ Lisa Educational Sys.	119.95	Now	99.50

DYNOMITE DEAL #2

Silicon Valley
WORD HANDLER
REGULAR $249.95
NOW $159.50

BUSINESS PROGRAM SPECIALS

☐ CPA #1 General Ledger	250.00	Now	199.50
☐ CPA #2 Accounts Receivable	250.00	Now	199.50
☐ CPA #3 Accounts Payable	250.00	Now	199.50
☐ CPA #4 Payroll	250.00	Now	199.50
☐ The Budget Planner	150.00	Now	125.50
☐ Tax Beater	129.95	Now	105.50
☐ Real Estate Analysis Program	129.95	Now	105.50
☐ Financial Partner	175.00	Now	152.50
☐ Apple Pie (All Versions)	129.95	Now	109.50
☐ Tax Preparer	150.00	Now	135.50
☐ Creative Financing	150.00	Now	135.50
☐ Datadex Data Base Manager	150.00	Now	129.50
☐ Datafactory 5.0	300.00	Now	249.50
☐ Time Manager	150.00	Now	127.50
☐ Screenwriter II	129.95	Now	109.50
☐ The General Manager	99.95	Now	86.50
☐ Dictionary	99.95	Now	86.50
☐ Executive Speller	75.00	Now	69.50
☐ Magic Window Word Proc.	99.95	Now	84.50
☐ Magic Mailer	69.95	Now	57.50
☐ Magic Words	69.95	Now	57.50
☐ PFS: Personal Report Sys.	95.00	Now	79.50
☐ IFO Database Manager	120.00	Now	105.50
☐ Inventory System 3.3	200.00	Now	174.50
☐ D-B Master	229.95	Now	189.50
☐ D-B Utility Pack	99.95	Now	89.50
☐ D-B Utility Pack #2 (May)	99.95	Now	89.50
☐ Visacalc 3.3	250.00	Now	209.50
☐ Visifile	250.00	Now	209.50

GAMES SPECIALS

☐ Eliminator	29.95	Now	25.50
☐ Temple of Apshai	39.95	Now	32.50
☐ Crush, Crumble and Chomp	29.95	Now	24.50
☐ Ricochet	19.95	Now	17.50
☐ Zero Gravity Pinball	29.95	Now	25.50
☐ Star Blazer	31.95	Now	26.50
☐ Labrinth	29.95	Now	25.50
☐ Dueling Digits	29.95	Now	25.50
☐ Bug Attack	29.95	Now	25.50
☐ Apple Barrel II (20 Programs)	34.95	Now	29.50
☐ Snack Attack	29.95	Now	24.50
☐ County Fair	29.95	Now	25.50
☐ Casino	39.95	Now	34.50
☐ The Prisoner	29.95	Now	25.50
☐ Rendezvous (April)	39.95	Now	32.50
☐ Alien Ambush	24.95	Now	19.50
☐ Horizon V	34.95	Now	28.50
☐ Sargon II	34.95	Now	29.50
☐ Reversal (Othello)	34.95	Now	29.50
☐ Zork II	39.95	Now	32.50
☐ Robot Wars	39.95	Now	34.50
☐ A.B.M.	24.95	Now	22.50
☐ Three Mile Island	39.95	Now	34.50
☐ Castle Wolfenstein	29.95	Now	25.50
☐ Wizard and the Princess	32.95	Now	29.50
☐ Hi-Res Soccer	29.95	Now	25.50
☐ Threshold	39.95	Now	35.50
☐ Time Zone	99.95	Now	86.50
☐ Marauder	34.95	Now	28.50
☐ Microchess 2.0	24.95	Now	22.50
☐ Gammon Gambler	24.95	Now	22.50
☐ Falcons	29.95	Now	25.50
☐ Star Blaster	29.95	Now	25.50
☐ Congo	32.95	Now	28.50
☐ Fastgammon	24.95	Now	21.50
☐ Beer Run	34.95	Now	29.50

DYNOMITE DEAL #3

WHILE THEY LAST!

Buy 1 Edu-Ware "Space" at $29.95
Get "Space II" (Reg. $24.95)

FREE!

☐ Kabul Spy	34.95	Now	28.50
☐ Bandits	34.95	Now	28.50
☐ Draw Poker	29.95	Now	24.50
☐ Computer Baseball	39.95	Now	33.50
☐ Tigers in the Snow	39.95	Now	34.50
☐ Computer Air Combat	59.95	Now	49.50
☐ Napoleons Campaign	59.95	Now	49.50
☐ Road to Gettysburg	59.95	Now	49.50
☐ Pursuit of th Graft Spee	59.95	Now	49.50
☐ Flight Simulator	33.50	Now	29.50
☐ Odyssey	30.00	Now	24.50
☐ Adventure to Atlantis	40.00	Now	34.50
☐ Space Raiders	29.95	Now	25.50

FREE OFFER

—Your Choice—
Original
Adventure Game
or **Applesoft™ Tutorial**
on disc with
purchase of
Any 3 Programs!

DEDUCT 3% if payment accompanies order. WE PAY SHIPPING on all software orders OVER $50 in Continental U.S. (Foreign & Air Extra). ADD $2.50 SHIPPING & HANDLING on orders under $50. CALIF. RESIDENTS ADD 6% SALES TAX. We accept MASTER CARD and VISA. C.O.D.'S ADD $5.00.

NAME ______________________________
STREET ______________________________
CITY ____________________ STATE & ZIP __________
CARD # ____________________ EXP. DATE __________
SIGNATURE ______________________________

★ 518 E. ECHO CT., SAN BERNARDINO, CA 92404
Outside Calif. Call (800) 854-5649
Calif. Residents Call (714) 886-0761

Prices Subject to Change without Notice

CIRCLE 220 ON READER SERVICE CARD

Listing 1.

```
:ASM
                      HPOSN    EQU  $F411
                      *
                      * THE FOLLOWING THREE VARIABLES
                      * ARE PROGRAM VARIABLES THAT
                      * WOULD BE USED TO HOLD THE
                      * COORDINATES PASSED TO HPOSN
                      *
                      VERT     EQU  $FD    ;ANY FREE LOCATION
                      HORLO    EQU  $FE    ;WILL DO
                      HORHI    EQU  $FF
                      *
                      * PUT VERTICAL POSITION IN
                      * THE ACCUMULATOR
                      *
7000: A5 FD                    LDA  VERT
                      *
                      * PUT LO BYTE OF HORIZONTAL IN X
                      * AND HI BYTE IN Y
                      *
7002: A6 FE                    LDX  HORLO
7004: A4 FF                    LDY  HORHI
                      *
                      * CALL THE ROM SUBROUTINE
                      *
7006: 20 11 F4                 JSR  HPOSN

--- END ASSEMBLY ---

TOTAL ERRORS: 0

9 BYTES GENERATED THIS ASSEMBLY
```

The best way to understand exactly what is going on is to read a book on machine language. In many ways, it is simpler than Basic since there are relatively few things that can be done. Most operations involve placing a value in memory, changing a value in an arithmetic or logical manner, or controlling program flow.

The first few programs will be documented well enough so even those who are new to assembly language should be able to follow what is going on and make use of the techniques. Let's get on with it.

Taking Control

Each Applesoft graphics command can be accessed as a ROM subroutine, but there is not exactly a one-to-one correspondence when programming. For instance, when you use an Applesoft command such as DRAW 1 AT 20,20, you are actually accessing both a drawing routine and a positioning routine.

When working from assembly language, these routines will be handled separately. But the general approach to using the routines is similar to the approach used from Basic. The first step in Basic is HGR. In assembly language, you would use JSR $F3E2. This subroutine performs the initialization of page 1 of hi-res. To set up page 2, use JSR $F3D8.

Once graphics has been initialized, there are several things the programmer can do: position the hi-res cursor, plot a point, draw a line, or draw a shape. We'll take a look at the subroutines for each of these actions.

If you are interested in how the routines work, the best place to start is in the back of the Programmer's Aid manual from Apple. This contains a documented disassembly of the graphics routines from the Programmer's Aid chip. Since these routines use page three of memory for storage of most variables, the code won't be exactly the same as the Applesoft ROM, but it is close enough to help show how the routines work. (The Applesoft routines use more zero-page storage. Since commands accessing this area of memory are only two bytes long, while commands accessing any other area of memory are three bytes long, the Applesoft routines are slightly shorter.)

Most of the ROM routines make use of parameters. These parameters are passed by the accumulator and the X and Y registers of the 6502. Also, at times, parameters are held in memory. For instance, location $E7 holds the scale for drawing shapes.

TED'S CARS
B. Boyle

"We'll take it."

First, we'll look at HPOSN, the routine that sets the hi-res cursor. As mentioned in an earlier article, the hi-res cursor determines where on the screen a point will be plotted or a shape drawn.

As you might have guessed, HPOSN requires two parameters, a horizontal value and a vertical value. These could be referred to as X and Y locations, but that would cause confusion with X and Y registers (the two have nothing in common), so the terms "horizontal" and "vertical" will be used. The vertical location, as in Basic, ranges from 0 to 191.

Horizontal values go from 0 to 279. Since the 6502 registers are only eight bits, with a maximum value of 255, the horizontal value cannot be contained in one register. Instead, the lo byte is placed in the X register and the hi byte is placed in the Y register. The vertical value is placed in the accumulator. Sample code for positioning the hi-res cursor can be found in Listing 1.

HPOSN is not very exciting since it doesn't put anything on the screen. This can be done with the HPLOT subroutine. It is set up just as HPOSN, but also requires a color. This is where things get interesting. Location $E4 holds the color value. But this value isn't in the range of 1 through 7 as it would be in Applesoft. Instead, it is a byte mask which handles the oddities of Apple colors. But the programmer doesn't have to worry about it.

PERSONAL COMPUTERS PERSONAL COMPUTERS PERSONAL COMPUTERS

Amdek Video-300	149.00
Amdek Color-I Monitor	329.00
Atari 810 Disk Drive	449.00
Atari 800 16K	669.00
Daisywriter 2000	1049.00
Diablo 630	2095.00
Epson MX-80 w/Graftrax	439.00
Epson MX-80 FT w/Graftrax	549.00
Epson MX-100 FT Printer	695.00
Hayes Smartmodem	225.00
IDS 560 Paper Tiger	1099.00
IDS Prism 80 (Color)	1379.00
IDS Prism 132 (Color)	1559.00
Mannesmann Tally MT 1802	1499.00
Microtek 32K Ramboard for Atari 400 & 800	119.00
Microsoft Soft Card (Z-80)	279.00
Microsoft Soft Card Premium System for Apple	579.00
Microsoft Ramcard 64K for IBM-P.C.	369.00
NEC 3510 or 3530 Spinwriter	1675.00
NEC 7710 or 7730 Spinwriter	2295.00
NEC PC-8023 Printer	489.00
NEC GREEN JB1201M — 12″ Monitor	169.00
Okidata Microline — 80 Matrix Printer	329.00
Okidata Microline — 82A	449.00
Okidata Microline — 83A	729.00
Okidata Microline — 84 Parallel	1095.00
Sharp PC-1500 Pocket Computer	239.95
Sharp CE-150 Color Printer/Cassette I/F	199.95
Smith-Corona TP-1	649.00
Televideo 910	559.00
Televideo 925	725.00
Televideo 950	929.00
Videx Videoterm 80 Column Card for Apple II	259.00

OMEGA DELIVERS FOR LESS

OKIDATA MICROLINE 83A

or

EPSON MX-100 FT

YOUR CHOICE
$695.00

SOFTWARE

Omega carries software by the following companies:
- American Business Systems • Ashton Tate • Dakin 5
- Innovative Software • Micropro • Microsoft
- Sorcim • Stoneware • Visicorp (Personal Software)

MAGNETIC MEDIA

Omega carries diskettes (5¼″ or 8″) by listed companies:
- Dysan • Maxell • Scotch • Verbatim

ACCESSORIES

Omega carries accessories for the Apple II by the following manufacturers:
- D.C. Hayes • Microsoft • Tymac
- M & R Enterprises • Videx

CALL TOLL FREE!
800-343-0873

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

We carry the complete line of Atari Hardware, Software & Peripherals.

We will try to match or beat any price with similar purchase conditions.

OMEGA SALES COMPANY

430 PEARL STREET, STOUGHTON, MA 02072
(617) 344-6645 TOLL FREE (800) 343-0873

CIRCLE 236 ON READER SERVICE CARD

Graph Paper, continued...

Obviously, Applesoft requires a routine to change the Basic HCOLOR value to the proper color mask. This routine is also in ROM. Just place the desired color number in the X register and JSR $F6F0.

Once you are able to plot a point, you can do all sorts of things, just as we did with the Applesoft HPLOT command. Data stored in tables can be used to draw figures or plot functions. And, just as the HPLOT routine in Applesoft can also be used to draw lines, there is a monitor routine to do this task.

To draw a line, first set the starting point with the HPLOT or HPOSN subroutine, as described above. Next, the other endpoint must be defined. For some reason, while it requires the same parameters, they are passed in a different fashion. The vertical coordinate goes into the Y register. The lo byte of the horizontal coordinate goes into the X register and the accumulator gets the lo byte. The routine is located at $F53A.

The DRAW and XDRAW subroutines are next on the list. Before drawing anything, the hi-res cursor must be positioned. This is done with HPOSN. Also, color and scale must be defined. Scale is determined by the value in location $E7. As in Applesoft, scale increases from 1 to 255, and a value of 0 gives the largest possible scale. Rather than use an index into the shape table, each shape can be referenced by its actual location, which allows one, if he wants, to scatter shapes through memory. The Y register contains the hi byte of the shape location while the X register holds the lo byte. The accumulator contains the rotation. The address of DRAW is $F601, and XDRAW is at $F65D.

As an example of how to use these subroutines, Listing 2 contains a program that draws spirals on the screen. It uses a small shape consisting of a single dot, and draws larger lines by changing the scale. The routine takes advantage of the fact that when a shape is drawn, the hi-res cursor ends up wherever the last command in the table left off. In this case, where the table just contains a command to plot and then move, the cursor will always be found at the end of the line.

Animation using the ROM routines is done in the same fashion as animation from Applesoft. A shape is drawn, then it goes through a sequence of erases and draws. Page flipping can be used, with the value in location $E6 determining which page is accessed. A value of $20 is used for page 1, while a value of $40 puts you in touch with page 2.

A Bit of Philosophy

This month's prize-winning question (the prize is a copy of *Shape Master*) comes from Mike Cameron who writes,

Listing 2.

```
:ASM
                         ORG  $1000
               HGR       EQU  $F3E2
               HPOSN     EQU  $F411
               DRAW      EQU  $F601
               HCOLOR    EQU  $F6F0
               SCALE     EQU  $E7
               FULLSCRN  EQU  $C052
               *
               * FOLLOWING VARIABLES ARE
               * PROGRAM VARIABLES AND NOT
               * PART OF THE ROM ROUTINES
               *
               COLOR     EQU  $FE
               ROT       EQU  $FF
               TABLE     EQU  $300
               *
1000: 20 E2 F3           JSR  HGR      ;INITIALIZE GRAPHICS
1003: 8D 52 C0           STA  FULLSCRN ;SET FULL SCREEN MODE
               *
               *SET UP SMALL SHAPE DEFINITION
               *
1006: A9 04              LDA  #$04     ;VECTOR FOR PLOT AND
1008: 8D 00 03           STA  TABLE    ;MOVE UP.
100B: A9 00              LDA  #$0      ;MARK END OF SHAPE
100D: 8D 01 03           STA  TABLE+1
               *
               *STORE COLOR VARIABLE
               *
1010: A9 03              LDA  #$03     ;WHITE 1
1012: 85 FE              STA  COLOR
               *
               *GIVE INITIAL POSITION
               *AT CENTER SCREEN
               *
1014: A0 00    LOOP1     LDY  #$0      ;HORIZONTAL HI BYTE
1016: A2 8C              LDX  #$8C     ;HORIZONTAL LO BYTE
1018: A9 60              LDA  #$60     ;VERTICAL COORDINATE
101A: 20 11 F4           JSR  HPOSN    ;SET HI-RES CURSOR
               *
               *SET COLOR
               *
101D: A6 FE              LDX  COLOR
101F: 20 F0 F6           JSR  HCOLOR
               *
               *SET INITIAL SCALE
               *
1022: A9 01              LDA  #$01     ;SMALLEST SCALE
1024: 85 E7              STA  SCALE
               *
               *AND INITIAL ROTATION
               *
1026: A9 00              LDA  #$0      ;ROT=0 DEGREES
1028: 85 FF              STA  ROT
               *
               *MAIN LOOP
               *
102A: A2 00    DRAWLOOP  LDX  #$0      ;LO BYTE OF SHAPE ADDRESS
102C: A0 03              LDY  #$03     ;HI BYTE OF SHAPE ADDRESS
102E: A5 FF              LDA  ROT
1030: 20 01 F6           JSR  DRAW
1033: A5 FF              LDA  ROT
1035: 18                 CLC
1036: 69 10              ADC  #$10     ;PRODUCES A ROTATION
1038: 85 FF              STA  ROT      ;OF 90 DEGREES
103A: E6 E7              INC  SCALE    ;INCREASE SIZE OF SHAPE
103C: E6 E7              INC  SCALE
103E: A5 E7              LDA  SCALE
1040: C9 BD              CMP  #$BD     ;TOO LARGE?
1042: D0 E6              BNE  DRAWLOOP ;NO
               *SPIRAL IS NOW DRAWN. TIME TO
               *CHANGE COLOR (ALTERNATING
               *BETWEEN BLACK AND WHITE) AND
               *DO IT ALL AGAIN.
1044: A5 FE              LDA  COLOR
1046: 49 03              EOR  #$03
1048: 85 FE              STA  COLOR
               *
               *CHECK FOR KEYPRESS
               *
104A: AD 00 C0           LDA  $C000
104D: 10 C5              BPL  LOOP1
104F: 2C 10 C0           BIT  $C010
1052: 60                 RTS

--- END ASSEMBLY ---

TOTAL ERRORS: 0

83 BYTES GENERATED THIS ASSEMBLY
```

"What type of routines should a person use in machine language?" He goes on to say that he has seen the points for Applesoft ROM routines, but believes there must be better routines around, such as those found in some assemblers.

Before directly answering the question, I would like to point out what I feel is the main reason for not using the ROM routines. If you are writing a program that accesses the ROM routines, you have already committed yourself to a fair amount of assembly language coding. Having gone this far, it isn't much of a leap to reach the point where you don't need the ROM routines. When you use ROM subroutines, you are restricting yourself to generalized code with rigid requirements and format.

There are only two viable options: either use one of the specialized graphics packages on the market or write your own code. The choice depends on the application. There are some good animation packages on the market that provide subroutines for many applications. But if you plan to have a really large number of objects moving at high speed, you may need specialized code.

For instance, if you wanted to move twenty occurrences each of three shapes, it would be better to write three routines—one to draw each shape at maximum speed—than to use a general shape-drawing routine. Also, writing your own code is the best way to get a feel for graphics and to really understand what is going on.

In general, the best routine is whatever routine accomplishes the job without taking too much time or placing too many restrictions on the programmer. The ROM routines fail to meet these criteria for most applications.

In future articles, we'll be developing specialized routines for drawing shapes and performing other graphics functions. These will serve as building blocks or starting points, allowing you to develop the right routine for each job.

Other Stuff

Thanks to Dan Lazarowski who wrote a note concerning the circle-drawing program from August. He mentions that the FOR...NEXT loops can be calibrated by adding

```
50 S=ATN(1/RA)
60 FOR I=O to 6.30 STEP S
```

He points out that this produces "the smoothest circle possible without overdoing precision and thus slowing down the program." All in all, a nice touch and a good example of expanding on a program.

Next month we'll cover assembly language routines that access and manipulate the hi-res screen, and take a look at character graphics. See you then. ☐

SOFTWARE FOR THE ATARI
For the ATARI 400/800 Computers

WORD SEARCH PUZZLE MAKER—Make word search puzzles with your words or ours and an 80-column printer. **24K Cassette: $24.95 24K Disk: $24.95**

CHRISTMAS MUSIC—SETS 1, 2, & 3: Sing along with your Atari. Words and music (8 carols each). For use with the Atari Music Composer cartridge. Great gift for the whole family. **16K cassette, 16K Disc - $24.95 each. Specify set number.**

ATARI 400/800 CARTRIDGES—Centipede, Missile Command, Pac-Man, Space Invaders, Super Breakout, Chess, Asteroids. $33.00 each or 3 for $90.00; other products available—write for catalog.

All programs come with a manual. Disk versions come with AUTORUN.SYS file.
Please add $2 postage and handling per order.
Michigan residents add 4% sales tax.

Computer's Voice
2370 Ella Dr.—Dept. 130
Flint, MI 48504
(313)-238-5585

EDUCATIONAL SOFTWARE
TRS-80, COLOR COMPUTER, PET
& APPLE II

ELEMENTARY	**MATH**
SCIENCE	**HISTORY**
GEOGRAPHY	**ACCOUNTING**
ECONOMICS	**BUSINESS ED.**
FOREIGN LANG.	**PHYSICS**
GRAMMAR	**FARM RECORDS**

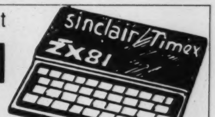
Write for FREE Catalogue:

MICRO LEARNINGWARE, Box 2134, N Mankato, MN 56001
(507) 625-2205
VISA & MASTER CARD ACCEPTED

We pay 15% royalty for Educational Programs listed with us.
TRS-80 is a registered trademark of TANDY CORP.
PET is a trademark of COMMODORE BUS. MACHINES.
APPLE is a trademark of APPLE COMPUTER CO.

CIRCLE 216 ON READER SERVICE CARD

Get Serious About
ZX81
Computing



PROFESSIONAL KEYBOARD. Makes your ZX81 easier to use. Enter programs quickly and error-free. Plugs straight into your ZX81 without any soldering. Has 47 keys and a full space bar. **$85.00**

32K RAM. Expand the memory capacity of your ZX81 with this direct-plug-in module. Fully compatible with Sinclair's 16K RAM (to give your ZX81 system a full 48K). **$99.95**

64K RAM. Expand your ZX81 memory capacity to its maximum. Plugs in directly to your ZX81. **$149.95**

Software on Cassette

MULTIFILE PLUS.
Data storage system for 16K to 64K systems. Flexible, user-defined setup. Includes program tape, detailed instruction manual, 3 data tapes, storage case. **$34.95**

GAMES	
MAZOGS A maze-adventure	$9.95
INVADERS 10 levels of play	$9.95
STAR TREK Zap the Klingons	$9.95
DICTATOR Political adventure	$14.95

Call (716) 874-5510 for Visa, MC Orders.

GLADSTONE Electronics
Mail order to 1585 Kenmore Ave., Buffalo N.Y. 14217
Checks or money orders. No CODs. Add shipping.

CIRCLE 178 ON READER SERVICE CARD

SUPER SALE

EPROM's	**1-7**	**8 up**	**50 up**
2716 (5V, 450nS)	$3.95	$3.55	CALL
2732 (5V, 450nS)	7.49	6.55	CALL
2532 (5V, 450nS)	8.49	7.55	CALL
2764 (5V, 300nS)	19.95	CALL	CALL
STATIC RAM			
6116P-3 (150nS)	6.50	6.30	CALL
2114L-2 (200nS)	2.10	1.70	CALL
DYNAMIC RAM			
4164-2 (200nS)	7.90	7.49	CALL
(150nS also available) CALL			

MISC
CPU Z80A . . . . $5.29 ea.
CDP-1854ACE (UART) . . . . . . $4.80 ea.
16K RAM Expansion Kit
for TRS-80 Mod III $12.95/8

SUNTRONICS CO., INC.
12621 CRENSHAW BOULEVARD
HAWTHORNE, CALIFORNIA 90250
STORE HOURS [illegible]
IN CALIFORNIA **(213) 644-1149**
OUTSIDE CALIFORNIA TOLL FREE **1-800-421-5775**
Min Order: $10. P/H: $2. Accept VISA, Mastercard, Check or M.O.

CIRCLE 297 ON READER SERVICE CARD

– Professional –
REAL ESTATE SOFTWARE
for APPLE, TRS-80 & CPM SYSTEMS

- PROPERTY MANAGEMENT SYSTEM: $375
  - Tenant History
  - Late Rent Report
  - Vacancy Report
  - Income Report
  - Auto Late Charge
  - Returned Checks
  - Operating Stmt.
  - Building Reports
  - Utilities Report
  - Tax Expense Report
  - Prints Checks
  - Prints Receipts
- PROPERTY LISTINGS/COMPARABLES: $325
  - 22 Items/Listing
  - 1000 Listing/Disk
  - Listing Memo Field
  - —— SCREEN BY ——→
  - Max/Min Price
  - Units/Zone/City
  - Max Price/Income
  - Max Price/Sq Foot
  - Min Cashflow
- REAL ESTATE ANALYSIS MODULES: $50/Module
  - Home Purchase
  - Income Prop Analysis
  - Property Sales
  - Construction Cost/Profit
  - Tax Deferred Exchange
  - APR Loan Analysis
  - Loan Amortization
  - Depreciation/ACRS Analysis
- WORD PROCESSOR – MAGIC WAND: $265

RSC Software Realty Company™

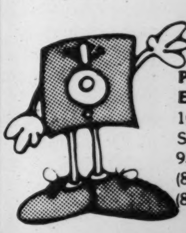
At Computer Stores Everywhere
or Order COD Direct
Cal Residents add 6% Sales Tax
(213) 372-9419

Suite E, 1116-8th Street, Manhattan Beach, CA 90266

CIRCLE 261 ON READER SERVICE CARD

MEMOREX
FLEXIBLE DISCS

WE WILL NOT BE UNDERSOLD!! Call Free **(800)235-4137** for prices and information. Dealer inquiries invited and C.O.D.'s accepted.



PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401 In Cal. call
(800)592-5935 or
(805)543-1037

CIRCLE 240 ON READER SERVICE CARD

COMPUTERS

SONY MICROCOMPUTER FOR BUSINESS

Sony Corporation of America announces a desktop microcomputer, the SMC-70, for business applications.

The strengths of the unit are its compact size, ease of use, high degree of reliability, system expandability and versatility, memory capacity and cost/performance ratio.

Peripheral devices and accessories include an optional 16-bit adaptor unit that upgrades the SMC-70 from a Z80A system to an 8086 system, and a slideout tray that accepts snap-in expansion modules for interfacing accessories or for extending system capabilities.

Priced at $1475, the basic unit offers 64K of program/data memory, an additional 38K of graphics memory and a separate 32K of system memory. The system memory includes a resident Sony interpretive Basic extended for graphics and the system monitor for auto-start and booting the operating system.

Sony Corporation of America, Corporate Communications Department, 9 West 57th St., New York, NY 10019. (212) 371-5800.

CIRCLE 355 ON READER SERVICE CARD

TERMINALS & I/O

INTELLIGENT PRINTER INTERFACE

Compulink Corporation has introduced SooperSpooler, an intelligent printer interface designed to free microcomputers from the task of printing. Many software selectable formatting features are accessible with a Basic program.

The base model includes a 16K memory and Centronics compatible I/O ports. A self contained power supply and a two-digit LED display showing the amount of data stored in the buffer are also standard features. Options include memory expansion to 62K, and RS-232 serial I/O ports that can also be modem transmission and serial to parallel translation.

List price for the base model is $349, memory expansion $159, and serial option $95.

Compulink Corporation, 1840 Industrial Circle, Longmont, CO 80501. (800) 525-6705.

CIRCLE 356 ON READER SERVICE CARD

APPLE II SERIAL I/O CARD

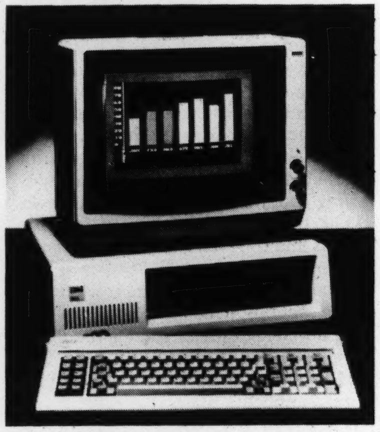
MPC Peripherals Corporation announces the AP-SIO asynchronous serial input/output interface card for the Apple II computer.

Switch selectable firmware options include auto LF/noLF, strip incoming LFs, half duplex/full duplex, and lower to upper case conversion/no conversion, and crystal controlled baud rates from 500 to 19,200. $129.50.

MPC Peripherals Corporation, 9424 Chesapeake Dr., San Diego, CA 92123. (714) 278-0630.

CIRCLE 357 ON READER SERVICE CARD

GRAPHICS DISPLAY FOR IBM, APPLE II AND III



The portable Color II monitor, introduced by Amdek Corp. features direct-coupled RGB digital inputs for high line resolution, 560 x 240, and provides 80 x 24 character display capability. Designed for compatibility with IBM, Apple II, and Apple III personal computers, the Color II monitor offers 16-color intensity modulation for IBM personal computers, and may be used with an optional Amdek Digital Video Multiplexer for Apple II compatibility.

Amdek Corp., 2420 E. Oakton St., Suite E, Arlington Heights, IL 60005. (312) 364-1180.

CIRCLE 358 ON READER SERVICE CARD

80 COLUMNS FOR ATARI

Bit 3 Computer Corporation has introduced word processing capabilities for the Atari 800 with the Full-View 80 Display Card and the 32K Memory Plus, which combine to make the Atari 800 a 48K 80-column computer.

2"x3" ads only $330!

creative computing
CREATIVE COMPUTER MART

Reach 150,000 customers

CALL COLLECT
(212) 725-4299

Creative Computing
BUYER'S GUIDE TO PERSONAL COMPUTERS, PERIPHERALS AND ELECTRONIC GAMES
Send $5.00 ($3.95* plus $1.05 postage and handling) to:
Creative Computing
1983 Buyer's Guide
P.O. Box 640, Holmes, PA 19043
*NJ residents add 5% sales tax.
Outside U.S.A. $6.00.

Dysan
CORPORATION

Solve your disc problems, buy 100% surface tested Dysan diskettes. All orders shipped from stock, within 24 hours. Call toll FREE (800) 235-4137 for prices and information. Visa and Master Card accepted.

PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401. (In Cal. call
(805) 543-1037)

CIRCLE 240 ON READER SERVICE CARD

AFRAID OF HIGH SOFTWARE PRICES?

6 to 8 programs on CASSETTE every MONTH for (shudder) about 75 cents per program!

TRS-80 MODEL I & III

TRS-80 COLOR COMPUTER

Writing your own programs can be a scary proposition. And typing in a program from a hardcopy listing is a real nightmare! Bring on the dawn with a subscription to CLOAD or CHROMASETTE Magazine.

CLOAD and CHROMASETTE Magazines are monthly cassettes containing 6 to 8 ready-to-load programs apiece. Programs that take advantage of features unique to each computer (CLOAD for the Model I and III, CHROMASETTE for the Color Computer). Programs that even extend the capabilities of your computer beyond its manual's dark type! Quality game, tutorial, practical, and utility programs that reach your home by First Class Mail each month.

Don't be afraid. Get a subscription to CLOAD or CHROMASETTE Magazine. Or just enjoy a little taste and sink your fangs into a back issue. It von't take a bite out of your vallet.

CLOAD
MAGAZINE INC.

The Bottom Line:

1 year (12 issues)	$50.00
6 months (6 issues)	$30.00
Single copies Back issues	$ 6.00
Good Games #1	$12.00
Adventures #1	$13.00

California residents add 6% to single copies. North America — First Class Postage Included. Overseas — add $10 to subscriptions, and $1 to single copies. Sent AO rate.

The Fine Print
All issues from Oct '78 on available — ask for list (24 Level I issues also). Programs are for 16K Level II, 16K Model III, and occasionally for disks. **TRS-80** is a trademark of Tandy Corp.

P.O. Box 1448
Santa Barbara, CA 93102 (805) 962-6271

MasterCard/Visa

Chromasette
Magazine

The Bottom Line:

1 year (12 issues)	$45.00
6 months (6 issues)	$25.00
Single copies	$ 5.00

Calif. residents add 6% to single copies. North America — First Class Postage Included. Overseas — add $10 to subscriptions, and $1 to single copies. Sent AO rate.

P.O. Box 1087,
Santa Barbara, CA 93102
(805) 963-1066

The Fine Print:
Issues are sent First Class Mail. All issues from July 1981 on available — ask for list. Programs are for the Extended BASIC model and occasionally for disks.

CIRCLE 136 ON READER SERVICE CARD

CIRCLE 137 ON READER SERVICE CARD

New Products, continued...

The Full-View 80 gives the Atari 80-column capability, with upper and lower case characters, while retaining the normal Atari 40 column/graphics mode.

The Full-View 80 is fully compatible with Basic and machine language.

The 32K Memory Plus card doubles the memory capacity of the Atari 400, and the Atari 800 allows 48K capacity, while freeing a slot for the Full-View 80, so that both 80-column display and 48K of memory are available together.

The Full-View 80 is independent of the 32K Memory Plus and will operate in a 32K environment. Full-View 80—$349; 32K Memory Plus—$179. Bit 3, 8120 Penn Ave. S., Minneapolis, MN 55431. (612) 881-6955.

CIRCLE 359 ON READER SERVICE CARD

DISK SYSTEMS

HARD DISK FOR APPLE

XComp has entered the Apple Hard Disk market with its Personal Hard Disk 5 and 10 megabyte subsystems.

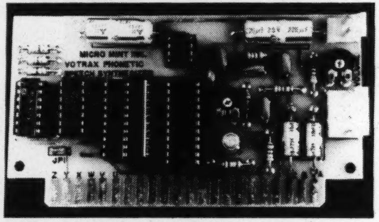
The PHD is built around a 5.25" Winchester disk, and stores data simultaneously for all three operating systems, Apple DOS 3.3, Pascal, and CP/M. The 10 megabyte unit is equivalent in storage capacity to 69 Apple diskettes and operates as six Apple drives using a phantom drive technique. The PHD uses all standard system commands and is compatible with existing software. $3,995. XComp, 7566 Trade St., San Diego, CA 92121. (714) 271-8730.

CIRCLE 360 ON READER SERVICE CARD

PERIPHERALS

SPEECH SYNTHESIZER

Capable of pronouncing any word in the English language, the Sweet Talker provides a simple means of adding speech to a computer.



Featuring the Votrax SC-01A phonetic speech synthesizer chip which requires less than 100 bits per second for continuous speech, the Sweet Talker speaks 64 phonemes with four levels of inflection and includes an onboard audio amplifier and volume control.

Model ST-01 ($139) interfaces to any parallel port and Model ST-02 ($149) is designed for the Apple II/II+ Computer.

Micromint, Inc., 917 Midway, Woodmere, NY 11598..(516) 374-6793.

CIRCLE 361 ON READER SERVICE CARD

SPEECH PROCESSING FOR APPLE

Mimic, Inc. announces low cost speech processing for Apple users. Mimic Speech Processors are currently available for the Apple II Plus. Prices range from $20 to $200.

Mimic also announces its Mimtalk software package which is designed for the microcomputer user desiring easy-to-implement speech processing capability.

Mimic, Inc., P.O. Box 921, Acton, MA 01720. (617) 263-2101.

CIRCLE 362 ON READER SERVICE CARD

Peripherals Unlimited...

FANTASTIC PRICES!

OUR FAST SERVICE, PRODUCT SELECTION AND OUR CUSTOMERS' SATISFACTION MAKE US #1.

Microsoft Z-80 Softcard	$214
Microsoft RAMCARD	$129
Z-90-64K DO	$2588
Z-19 Terminal	$777
Z-121 Monitor 12	$149

ATARI COMPUTERS	
Atari 800 16K	$649
Atari 400	$318
Atari Interface Module	$174
Atari 810 Single Disk	$444
Atari 830 Modem	$166
Programmer	$59
Entertainer	$84
Star Raiders	$34
16K Mem. Exp. for Atari	$74
32K Mem. Exp. for Atari	$114

NEC PRINTERS	
7710/30 Spinwriter R/O	Call
7720 Spinwriter KSR	Call
3510/30 Spinwriter R/O	Call

NEC DOT MATRIX	
PC-8023	$474

Call for prices on ribbons, etc.

MORE PRINTERS	
Anadex 9500/9501	$1295
Anadex DP-9000	$1049
Okidata Microline 82A	CALL
Okidata Microline 83A	CALL
Okidata Microline 84	CALL
Tractor (OKI 80 + 82 only)	$60
Diablo 630	$2044

MONITORS	
Sanyo 12 GRN Phosphor	$266
Sanyo 12 Black + White	$239
Amdek 12 300 GRN Phosphor	$149
Amdek 12 Color I	$319
Amdek Color II	$779
NEC 12 GRN Phosphor	$149
NEC 12 Color	$344

EPSON PRINTERS	
MX-80 w/Graphics	CALL
MX-80 FT (Friction + Tractor)	CALL
MX-100 (15 Carriage)	CALL

Call for prices on Ribbons, Cables and Interfaces

NEC PC 8000 Series Microcomputer

PC-8001A Computer w/32K	$888
PC-8012A w/32K + Exp. Slots	$588
PC-8031A Dual Mini Disk	$888
PC-8032A Add-on Mini Disk	$777

Call for Software Prices

FOR THE LOWEST PRICE CALL

TOLL FREE

1-800-343-4114

ORDERING INFORMATION

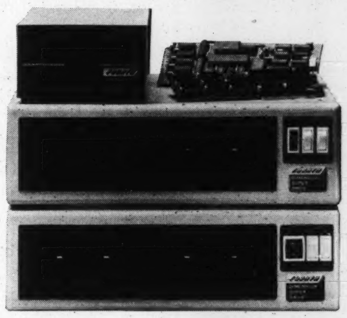
Our order lines are open 9AM to 6PM EST Monday thru Friday. Phone orders are welcome: same day shipment on orders placed before 10AM. Free use of Mastercard and VISA. Personal checks require 2 weeks clearance. Manufacturer's warranty included on all equipment. Prices subject to revision. C.O.D.'s accepted.

For service, quality and delivery call:

PERIPHERALS UNLIMITED
(617) 655-7400
62 N. Main St. • Natick, MA 01760

CIRCLE 245 ON READER SERVICE CARD

Fourth Dimension Has a Drive For Any Size Application



Making an APPLE II computer a serious business system is an easy, plug-in proposition. **Fourth Dimension's** complete line of APPLE-compatible disk drives has what it takes to increase data handling, storage, and back-up capabilities. All drives have advanced read/write electronics that virtually eliminate reading errors and a track-zero microswitch that makes boot and track access smooth and quiet. The entire line of drives performs efficiently with popular operating systems (DOS 3.2.1, DOS 3.3, Pascal, and CP/M).

Over 6000 units are on-line around the world, operating just as they should, being protected by a 12-month parts and labor warranty. Get serious . . . take a look at **Fourth Dimension** . . . and place your order today!

Look at these APPLE-compatible products:

Super Winchester/Floppy Drive Unit • 5¼" Winchester drive, 10 or 20 megabyte capacity • 5¼" floppy drive, double-sided 80-track (655,000 byte capacity) • Self-contained switch mode power supply • 35/80 track switch-selectable operation • Simple data transfer for back-up purposes • Reads half-track software

Super Drive — 5¼" Floppy Drive Unit • 35 track, single or double-sided format (143,360 byte capacity) • Excellent Winchester back-up unit • Data integrity standards meet or exceed professional user requirements • Plug-in APPLE-compatible

Dual 35/80-Track Super Drive Unit • Two switch-selectable 35/80 track, 5¼" floppy drives • Mains-powered, large capacity storage unit (120 VAC) • 35 track capacity = 286,000 bytes • 80 track capacity = 655,000 bytes

Supporting Products • 16K RAM card • Z80 card (APPLE) • Standard parallel printer interface • 80 x 24 video card • Enhancer diskette for 80 track use

New Products — Coming Soon • IBM PC compatible disk drive and controller • Commodore VIC 20 compatible 5¼" floppy drive & controller • 256K RAM card • Z80 card (IBM PC)

Utilizes Siemens, Teac and Seagate technology.

Call **Fourth Dimension Systems** for prices and specific product details. Worldwide distributor inquiries invited. Quantity discounts available in many countries.

• **Advanced Computer Products** (714) 558-8813 • **Electronics Associates** (804) 420-2361 • **Floppy Disk Services, Inc.** (609) 771-0374 • **Jade Computer Products** (214) 458-2782 • **RCE** (503) 479-4711

FOURTH DIMENSION SYSTEMS

Fourth Dimension Systems
1101 South Grand Ave.
Santa Ana, CA 92705
(714) 835-6202

APPLE, APPLE II, DOS 3.2.1, DOS 3.3 are registered trademarks of APPLE Computer, Inc.
Pascal is a trademark of UCSD.
CP/M is a registered trademark of Digital Research, Inc.
IBM PC registered by International Business Machines Corporation.
VIC 20 is a registered trademark of Commodore Business Machine Corp.

Leader of the Pack

BASF

5¼" $1.99*
SINGLE SIDE
DOUBLE DENSITY
W/HUB RING
48 TPI
100% CERTIFIED
2 YEAR WARRANTEE
SOFT, 10 OR 16 SECTORS

8" $1.99*
SINGLE SIDE
SINGLE DENSITY
100% CERTIFIED
2 YEAR WARRANTEE
SOFT OR 32 SECTORS

5¼" $2.99*
DOUBLE SIDE
DOUBLE DENSITY
W/HUB RING
48 TPI
100% CERTIFIED
2 YEAR WARRANTEE
SOFT, 10 or 16 SECTORS

8" $2.49*
SINGLE SIDE
DOUBLE DENSITY
100% CERTIFIED
2 YEAR WARRANTEE
SOFT OR 32 SECTORS

5¼" QUAD DENSITY
SINGLE SIDE
QUAD DENSITY 96 TPI
W/HUB RING
$3.75*
DOUBLE SIDE
QUAD DENSITY 96 TPI
W/HUB RING
$4.50*
100% CERTIFIED
2 YEAR WARRANTEE
SOFT. 10 OR 16 SECTORS

8" $3.09*
DOUBLE SIDE
DOUBLE DENSITY
100% CERTIFIED
2 YEAR WARRANTEE
SOFT OR 32 SECTORS

*
- **Minimum order 10**
- **Packed 10 boxes of 10 diskettes with sleeves and labels.**
- **Quantity discounts – 100 deduct 5%. 1,000 deduct 7%. 5,000 deduct 10%**
- **Add $5.00 per case 5¼". $7.00 per case 8" (case of 100) For shipping and handling Continential U.S.A., U.P.S. ground.**

VINYL STORAGE PAGES
5¼" or 8" **10/$5**

SNAP-IT POWER CENTER
Turn one outlet into six
- Shock-safe
- Unbreakable
- 15 Amp Circuit Breaker
- Lighted On-Off Switch

$19.95

DISK DRIVE HEAD CLEANING KITS
Prevent head crashes and ensure error-free operation
5¼" or 8" **$19.50**

HARDHOLE DISK PROTECTORS
Reinforcing rings of tough mylar protect disk hole edge from damage

	5¼"	8"
Applicators	$3	$4
Hardhole Rings (50)	$6	$8

SFD C- 10 CASSETTES . . 10/$7
(All cassettes include box and labels.)
Get 8 cassettes C-10 Sonic and Cassette/8 Library-Album as illustrated for only **$8**

LIBRARY CASES

8" Kas-sette 10	$2.99
5¼" Mini Kas-sette 10	$2.49

We also stock all FANTASTIC [illegible]
MAXELL 3M DYSAN
WABASH OPUS
Floppies, Tape, Data Cartridges, Data Cassettes and Disk Packs

• Written purchase orders accepted from government agencies and well rated firms for net 30 day billing. • International orders accepted with a 15.00 surcharge for handling, plus shipping charges. • C.O.D. requires a 10% deposit. • We accept Visa, Mastercharge, Money Orders, and Certified checks. • Checks require bank clearances. • All shipments F.O.B. San Diego. • Minimum shipping and handling 2.00, minimum order 10.00. • California residents add 6% sales tax. Prices and terms subject to change without notice. • All sales subject to availability, acceptance, and verification. • All sales are final. • Satisfaction guaranteed or full refund.

We also offer printer ribbons, printwheels, type elements, equipment covers, power consoles, paper supplies, storage and filing equipment, furniture and many other accessories for word and data processing systems. Write for our free catalog.

Toll Free Order Only
800-854-1555
For Information or California Orders
(714) 268-3537

ABC
DATA PRODUCTS
(FORMERLY ABM)

8868 CLAIREMONT MESA BLVD.
SAN DIEGO, CALIFORNIA 92123

CIRCLE 102 ON READER SERVICE CARD

RADIO SHACK TRS-80™

and

HEWLETT-PACKARD
85, 87 & 125 COMPUTERS

We offer Special Discounts, Free Shipping and a Toll Free Order Number

1-800-531-7466 TOLL FREE

Pan American Electronics

Dept. C.C. - 1117 Conway Avenue
Mission, Texas 78572
(512) 581-2766 Telex 767339
Branch
2912 North Main St.
Fort Worth, Texas 76106
(817) 625-6333 Telex 794836

CIRCLE 241 ON READER SERVICE CARD

Maxell Floppy Disks

The Mini-Disks with maximum quality.

maxell
MH1
maxell
MD2

Dealer inquiries invited. C.O.D's accepted. Call FREE (800) 235-4137

PACIFIC EXCHANGES
100 Foothill Blvd., San Luis
San Luis Obispo, CA 93401
In Cal. call (800) 592-5935 or
(805)543-1037

CIRCLE 240 ON READER SERVICE CARD

MicRo Information Systems
a division of M-R Information Systems, Inc.
Presents Educational Software
designed to motivate the student.
(programs available for the TRS-80
Mod III* and VIC**)
Write for complete catalog, to:
M-R Information Systems, Inc.,
P.O. Box #73, Wayne, N.J., 07470
* TM Tandy, ** TM Commodore

CIRCLE 227 ON READER SERVICE CARD

Advertise for $30.00

creative computing CLASSIFIED

Reach 150,000 customers

CALL COLLECT
(212) 725-4299

New Products, continued...

PERIPHERAL FOR H-89/Z-89

Artra Inc. announces Housemaster—an add-on printed circuit card for the H-89. The standard Housemaster board provides the H-89 with four separate peripherals on a single printed circuit card. These include voice recognition, stereo sound synthesizer, a real-time clock/calendar, and a BSR X-10 home control interface. Available options are a battery backup for the clock, two types of voice synthesis and two RS-232 serial ports. All options mount on the same board.

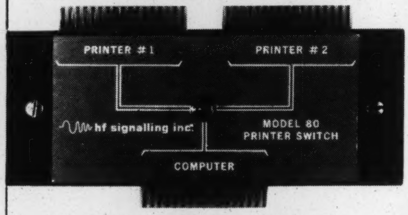
The price of the Housemaster board is $399 for the kit and $479 for the assembled, calibrated and tested version.

Artra Inc., PO Box 653, Arlington, VA 22216. (703) 527-0455.

CIRCLE 363 ON READER SERVICE CARD

MISCELLANEOUS

MODEL 80 LINE PRINTER SWITCH



HF Signalling Inc. announces the Model 80 Line Printer Switch. Designed specifically for TRS-80 Model I and III computers, it allows the user to have two separate line printers on line at all times.

The Model 80 Line Printer Switch connects to the printer port of the computer and provides an edge connector for each of two printers.

HF Signalling Inc., P.O. Box 17510, Kansas City, MO 64130. (816) 931-4448.

CIRCLE 364 ON READER SERVICE CARD

APPLE II SLOT SWAPPERS

Johnson Associates has developed Slot Swappers, a hardware device for the Apple II, which remedies problems caused by slot dependent software and hardware. Slot Swappers interchanges two slots with the flip of a switch to avoid hardware damage and eliminate card manipulation. $79.95.

Johnson Associates, Box 1870, Phoenix, AZ 85001. (602) 979-4554.

CIRCLE 365 ON READER SERVICE CARD

APPLE SYSTEM SAVER

System Saver for the Apple II protects programs and data by smoothing out power surges and spikes, and provides aerodynamically correct cooling by drawing air across the mother board, over power supply, and out the left-hand ventilation slots.

A power switch with pilot light allows user to power fan, surge suppression, computer, and 1 of 2 auxiliary outlets from one switch. $89.95.

Kensington Microware Ltd., 300 East 54th St., Suite 3L, New York, NY 10022. (212) 490-7691.

CIRCLE 366 ON READER SERVICE CARD

SYSTEMS SOFTWARE

SYSTEMS

Metatext is a text editor that comes on a single master disk and offers many Apple II system options. Features of the package include: full ASCII 80-column alphanumerics, 40-column option, creation routines, a text formatter, and various line-oriented text editors. The package includes a serial output program which will drive most RS232 printers from the existing game I/O connector. $79. Metaresearch, Inc., 1100 SE Woodward St., Portland, OR 97202. (503) 232-1712.

CIRCLE 367 ON READER SERVICE CARD

Extended S-C Applesoft Program Editor is a programmer's tool to speed up and simplify the development of Applesoft Basic programs. ES-CAPE provides a split-screen editing window, global search and replace, DOS command menu, list control, and more. $40. S-C Software Corporation, 2331 Gus Thomasson, Suite 125, Dallas, TX 75228. (214) 324-2050.

CIRCLE 368 ON READER SERVICE CARD

Dosplus II is a TRSDOS compatible alternative operating system for the TRS-80 Model II Microcomputer. A full line of support software is included including a terminal/host package and full disk editing/repair programs. The system uses Microsoft Basic. Also a standard floppy disk version for the Model II hard disk subsystems including Radio Shack, VR Data, Corvus, Micro-Mainframe, and QuCeS is available. $249.95. Micro-Systems Software Inc., 4301-18 Oak Circle, Boca Raton, FL 33431. (305) 983-3390. PowerSoft, 11500 Stemmons Fwy., Suite 125, Dallas, TX 75229. (214) 484-2976.

CIRCLE 369 ON READER SERVICE CARD

LANGUAGES

The **UCSD p-System** operating system is available for the Osborne 1 personal business computer. This machine-independent operating system for 8-bit and 16-bit microprocessors operates on the Apple, Tandy, Commodore, Texas Instruments, Xerox and IBM. The p-System allows programmers to work with any combination of UCSD Pascal, Fortran-77, Basic, and assembly language. Osborne Computer Corporation, Corporate Headquarters, 26500 Corporate Ave., Hayward, CA 94545. (415) 887-8080.

CIRCLE 370 ON READER SERVICE CARD

Peachtree Graphics Language is an interactive graphics programming language for CP/M based computers. Included with the Business Graphics System is an interface to Peachtree's PeachCalc Electronic Spreadsheet and PeachText Word Processor. IBM Personal Computer and CP/M 86 versions of PGL are also available. Peachtree Software Incorporated, 3445 Peachtree Rd., N.E., Atlanta, GA 30326. (404) 239-3000.

CIRCLE 371 ON READER SERVICE CARD

DATABASE MANAGEMENT

DataKEYper is a data management package for three and four floppy disk drive configurations. It runs on the Apple II Plus and a Corvus hard disk drive. A version is also available for a two floppy (5 1/4" or 8") disk configuration. DataKEYper is menu driven and handles up to 800 files. Some capabilities included are data file sort, file maintenance, file query, and report writer. $249.95. ESP Computer Resources Inc., 9 Ash St., Hollis, NH 03049. (603) 465-7264.

CIRCLE 372 ON READER SERVICE CARD

Data-Writer is a database manager for the TRS-80 Models I and III that can be used with a word processor or by itself as a stand-alone system for managing textual and numeric data. Ten programs provide functions for managing and using databases, including the ability to change their structures. $125. Software Options, Inc., 19 Rector St., New York, NY 10006. (212) 785-8285.

CIRCLE 373 ON READER SERVICE CARD

Disk Listmaker is an upgraded version of a 16K tape database for holding names or items plus five-digit codes. The disk version is available in 48K, with a capacity of 1000 names, and 32K with a 500-name capacity for TRS-80 Models I and III. $20. Manhattan Software, P.O. Box 1063, Woodland Hills, CA 91365. (213) 704-8495.

CIRCLE 374 ON READER SERVICE CARD

The **Rose** Management Information Group is database software for business or home use. Rose can be used to create a database for a customer list, or to generate reminder lists. It is designed to operate on Apple III computers. $349.95. The Denver Software Company, 14100 East Jewell Ave., Suite 15, Aurora, CO 80012. (303) 750-9980.

CIRCLE 375 ON READER SERVICE CARD

A disk based **Data Manager System** for the VIC-20 Computer is a comprehensive system that allows the user to define and manage his own database and record entries on disk. It can also create, add, delete, and change records, as well as browse through, search, print, and exit the file. It stores up to 1200 records on a single disk. In addition to the VIC-20 application, the system is also offered for any Commodore CBM or PET, Commodore 64, Atari 800, Apple II, and IBM Personal Computer. $59.95. MicroSpec, Ltd., 2905 Ports O'Call Court, Plano, TX 75075. (214) 867-1333.

CIRCLE 376 ON READER SERVICE CARD

File is a general purpose cassette-based file system that allows the user to construct, sort, maintain and print out a wide range of data types, such as mailing lists, accounts and book lists. The system requires an 8K PET/CBM or Vic-20 with 3K expansion cartridge. It expands automatically to all available memory. The package includes software on cassette and complete documentation. $9.95. Kinetic Designs, 401 Monument Rd. #171, Jacksonville, FL 32211.

CIRCLE 377 ON READER SERVICE CARD

The **RL-1 Relational Database Management System** is for the IBM personal computer and CP/M based systems. The RL-1 database is fully relational and includes such operators as selection, projection, and join. It also features query language, and relational editor and program interface. Other application packages are available also. $495. ABW Corporation, P.O. Box M1047, Ann Arbor, MI 48106. (313) 971-9364.

CIRCLE 378 ON READER SERVICE CARD

FIRST and FINEST

In Systems Software for Atari and Apple

MAC 65

First we delivered Atari's Assembler Editor (the cartridge)

Then we produced our enhanced EASMD

Now OSS is introducing the **finest** integrated assembly language development system yet!

In addition to being ideal for writing small "quick and dirty" subroutines and programs **MAC 65** shows its full power and speed when used with even the most complex of large assembly language source files

Naturally **MAC 65** is upward compatible with both EASMD and the Atari cartridge And of course the object code output is also compatible with OS A+ Atari DOS and or Apple DOS as appropriate

MAC 65 .... **$80.00***

OS A+

Optimized Systems Software — the group that produced **both** the **first** Apple DOS **and** the **first** Atari DOS — now brings you OS A+ which combines the **finest** features of these and other successful personal computer operating systems

OS A+ is the **first** and **finest** operating system available for **both** Apple II and Atari computers and features a keyboard-driven easy-to-use command processor In addition to several simple resident commands OS A+ allows logical and readable requests for even the most sophisticated utility commands In fact the user can even add system commands as desired

But the real power and flexibility of OS A+ is its ability to easily interface to devices and **disk drives** of virtually any kind and size File compatibility (with Apple DOS or Atari DOS as appropriate) device independence batch processing easy of use — OS A+ truly brings the **finest** in operating systems to **your** computer

AND NOW OS A+ (for standard Atari or Apple drives) is included as a part of **every** standard OSS language package Versions of OS A+ for some higher capacity drives available at extra cost

Unless otherwise noted all OSS products require 48K and at least one disk drive We recommend 64K for the Apple version of OS A+

SpeedRead+

The **first** and still **finest** speed reading tutor designed for **you** to use on **your** computer is available **only** from OSS

SpeedRead+ uses time-proven techniques to train **you** to instantly recognize words and phrases and yet it goes far beyond what mere mechanical devices are capable of

SpeedRead+ exercises your peripheral vision improves your eye movement and timing and generally works **with you** at your pace now and in the future

NOTE The Atari version of SpeedRead+ needs only 16K of RAM

SpeedRead+ **$59.95**

tiny c

As a product of Tiny C Associates **tiny-c** was the **first** structured language interpreter for microcomputers Now OSS brings this innovative interpretive language to **your** home computer While not having the speed and power of a true **C** compiler **tiny-c** is an excellent choice for the programming student who is ready to begin learning the valuable techniques of structured languages

tiny-c provides an easy-to-use easy-to-modify environment that encourages experimentation while promoting proper programming style The **tiny-c** package includes not only a comprehensive and instructional user manual but also **complete source**.

tiny-c **$99.95***

C 65

NOW AVAILABLE!

The **first** native mode **C** compiler ever produced for Atari **and** Apple computers

C 65 supports a very usable subset of the extremely powerful and popular **C** language Just as **C** is used by the most sophisticated programmers from the professional and academic communities so shall **C 65** prove to be a powerful and much-needed tool for 6502 software developers

C 65 supports integer and character types (and arrays) pointers fully recursive functions and much more

NOTE C 65 requires MAC 65 or an equivalent assembler. Two disk drives recommended but not required.

C 65 .... **$80.00***

TRADE UP

Trade up from Atari's Microsoft Basic to **BASIC A+** and receive a **$15 discount**. Call or write for details

BASIC A+

From the authors of Atari BASIC...

It's a fact! OSS gave you that **first** and **most popular** language for Atari Home Computers. But why be content with the **first** when you can have the **finest**?

BASIC A+ is the **only** logical upgrade available to the Atari BASIC programmer While retaining **all** the features which make Atari BASIC so easy to use we've **also** given BASIC A+ features that place it at the forefront of modern interpretive languages BASIC A+ will let **you** explore the worlds of structured programming superior input output helpful programming aids and even a very comprehensive PRINT USING command **And** exclusively for the Atari computer an almost unbelievable array of PLAYER MISSILE GRAPHICS commands and functions

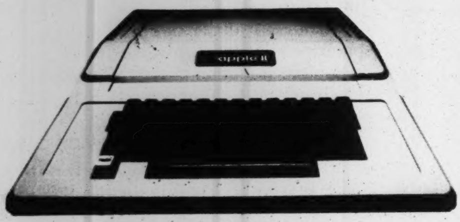
BASIC A+ **$80.00***

***REMEMBER**: Standard OS A+ is **included** at no extra charge with BASIC A+ MAC 65 C 65 and tiny c

[illegible] ***SpeedRead*** [illegible]

Optimized Systems Software, Inc.,
10379 Lansdale Ave., Cupertino, CA 95014. (408) 446-3099

CIRCLE 239 ON READER SERVICE CARD



le cart...apple cart...apple

Jack Trainor

Chuck Carpenter, who is on vacation this month, sent us the following note concerning the 2716 adapter and other items he wrote about for the August Apple Cart. Chuck will be returning next month with a new Apple Cart column.

On page 224 (top of 3rd column) there should be a plus sign (+) between the two CHR$ statements. On page 226, under the diagram, the first line should say "bend-up pins 18 and 21." Also on the same page, Ragnar's last name is Fyri.

The adapter I showed will work, but the information is incomplete. A speedy response from Ray Ransom provided the improved adapter circuit shown in Figure 1. As Ray points out in his letter, the adapter I showed will only work in machines with Integer Basic on the main circuit board and no language cards (slot 0), or memory board in any slot. That's because my adapter doesn't provide for the INH bar (INH NOT, active low) signal at pin 18. As far as I can determine, only the language and memory cards use this signal. Use of my adapter with peripheral cards may not cause a problem (I used it with my printer driver program until the programmers aid ROM came along in the $D000 slot). Check your schematic for the use of the INH signal at pin 18 of the ROM socket and pin 32 of the 50-pin expansion connectors.

Also, according to Ray, 2716s will work in an Integer Basic firmware card *only* if they are the 350 ns. variety, which are very rare. Furthermore, the programs contained in the EPROMs are available only when the card is enabled. My thanks to Ray for his timely comments and criticism.

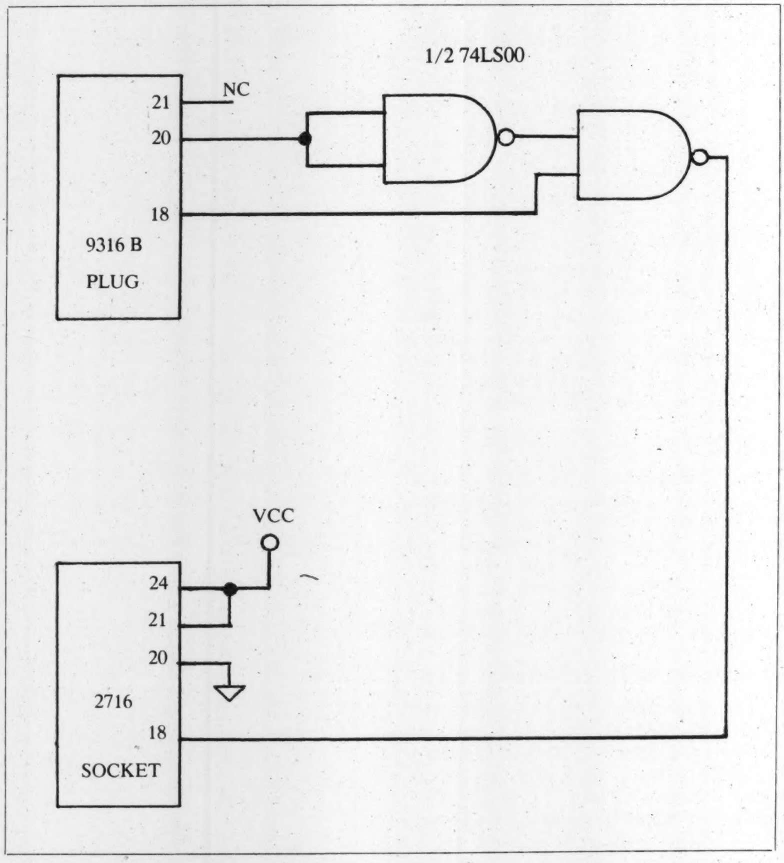


Figure 1. 2716 to 9316B adapter by Ray Ransom. All pins not shown are connected together. Be sure to provide appropriate voltages to the LS00.

Jack Trainor, 118 Norfolk St., Cambridge, MA 02139.

$2495
PUTS YOU IN BUSINESS.

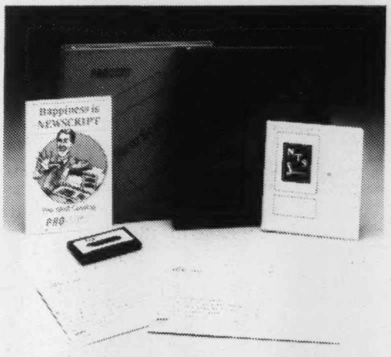
Introducing the MTI® BUSINESS Computer. We believe in offering you the best in complete, low cost computing.

- 90 Day Warranty
- One Year Extended Warranty Available
- Local Dealer Service
- TRS-80 Compatible

MTI MOD III PLUS B/140. A personal BUSINESS Computer that has been designed and priced for your business, your department…yourself. MTI BUSINESS Computers offer you many "upgrade" features as standard. All MTI BUSINESS Computers include a 65-key keyboard complete with a 12-key datapad, a large 12" monitor and anti-glare screen, RS-232 printer interface, cooling unit and more. The memory is 48K and has a Z80 processor and two double density disk drives. Perfect for BUSINESS use.

LOW PRICE. M.T.I. BUSINESS computers are priced from $2495. As an added incentive, we will give you a business software package **FREE** with the purchase of a MOD III PLUS BUSINESS computer. The software package has a retail value of $1588.00.

All of this for $2495.



FREE SOFTWARE ACCOUNTING PACKAGE

- ACCOUNTS RECEIVABLE
- ACCOUNTS PAYABLE
- GENERAL LEDGER
- INVENTORY/SALES ANALYSIS
- PAYROLL
- INCLUDES AUDIO SELF-LEARNING CASSETTE
- GAMES
- EDUCATION SOFTWARE
  DOS PLUS 3.3

WORD PROCESSING

We are also offering a discount certificate entitling the purchaser to NEW SCRIPT by Pro Soft. With NEW SCRIPT you have complete word processing software.

CIRCLE 209 ON READER SERVICE CARD

- **EASY TO USE**
- **READY TO OPERATE**
- **INCLUDES AUDIO SELF-LEARNING CASSETTE**

OPTIONS:
- LETTER QUALITY PRINTER
- WINCHESTER CP/M 2.2

OVER 100 AUTHORIZED DEALERS
CALL 714-979-9923
for the dealer-nearest you

U.S. PRICES F.O.B. SANTA ANA
CALIFORNIA AND MAY VARY BY AREA.

CP/M is a registered trademark of Digital Research, Inc.
TRS-80® is a registered trademark of Tandy Corp.
M.T.I. is a registered trademark of Microcomputer Technology, Inc.

WANT MORE?
For more information and a free catalog, write:
MICROCOMPUTER TECHNOLOGY INC.
3304 W. MACARTHUR, SANTA ANA, CA 92704

Name ____________________

Company ____________________

Address ____________________

City ____________ State ______ Zip ______

MICROCOMPUTER TECHNOLOGY INC.
3304 W. MACARTHUR, SANTA ANA, CA 92704
(714) 979-9923 · TWX 910-595-1902 MTISNA

Apple Cart, continued...

The Epson MX-80 and its big brother, the MX-100, have become the dominant printers for microcomputers and understandably so. It is a success story that parallels that of the Japanese cars—better than average features and performance coupled with incredible reliability.

The Epson delivers a handsome dot matrix typeface, is simple to operate, and just won't quit. In the past year Epson has come out with a graphics option, called Graftrax, that allows the MX printers to print hi-res graphics—a perfect complement to the Apple II. Not surprisingly several peripheral cards and software packages have emerged for the Apple-Epson combination.

I am the happy owner of an MX-80 and in this month's column I will review some of these new products, especially those that make use of the Graftrax.

Printer Interfacing

But first, I should provide a little background on printer interfacing, one of my favorite neglected topics in the microcomputer world.

At first glance interfacing a printer to a microcomputer looks easy. The power cord goes into an AC outlet; the printer cable goes into the computer—just a little more complicated than setting up a toaster. Would that it were so simple. Instead, you often find an unholy tangle of software, hardware, and firmware, and heaven help you if you don't have good dealer support when your printer and computer don't seem to be talking to each other. Neither the printer companies nor the computer companies are effectively addressing the issue of interfacing at present.

You may interface a printer to a computer in one of two ways: serial or parallel mode. Both modes have their standards—RS-232 for serial, Centronics-compatible for parallel. Both standards have enough leeway for sneaky incompatibilities, but this is more true for the RS-232 serial interface. In general my advice is to choose parallel rather than serial, since parallel transmits data faster, and is easier to interface. However, with parallel your cable length is limited to ten feet, and some printers do not have the circuitry for parallel interfacing.

The Epson MX-80 does contain a built-in Centronics parallel interface, so all the interface cards I will be writing about now are parallel cards. I will save serial interfacing—a much messier topic—for another time. (Except for the width of the carriage there is little difference between the MX-80 and MX-100. What I write will apply to the MX-100 as well.)

The MX-80 works perfectly well when interfaced to most parallel cards for the Apple II. The only exception to this is that some parallel cards, such as the CCS 7728, are not directly compatible with CP/M or Pascal, the other two operating systems for the Apple. I always check a printer interface card for compatibility outside of Apple DOS.

Epson markets its own parallel card (#8131) for the Apple II, and for a plain vanilla parallel card, it is a good buy. It has no firmware for a graphics dump or onboard memory for buffering, but it does its job dependably and unobtrusively for only $90. I have also seen a card by Microtek, the API-2, that works equally well for about the same price.

Printing Graphics

So far we have the Apple with a parallel card (in slot #1, of course) connected to an Epson MX-80 with Graftrax. But can you print graphics yet? Not quite. If you check your manual, you will find that the bit image graphics (as well as the other Epson features) are controlled by escape codes. To print an image from either of the Apple hi-res screens, the proper sequence of escape codes must be calculated then sent to the printer.

In other words, there must be a program that will translate the binary code, which represents an image in Apple memory to different binary code that will instruct the printer to print that image. Such a program performs what is known as a "graphics dump"—it dumps a graphic image to the printer.

To get a graphics dump, you could write the program yourself. It is a routine sort of program, not difficult, just tedious. Or you could take advantage of the programs commercially available. These come in two flavors: software and firmware.

Software you are already familiar with—it is just a package in which the program comes on a floppy disk that you boot and then follow directions.

Firmware, as the name suggests, is a cross between hardware and software. The machine code for the graphics dump is burnt into an IC chip, a ROM or a PROM, and mounted on the printer interface card. The program is activated to print graphics by sending the card a CONTROL-I followed by a string of code characters.

The end result, the printed graphics, depends on how the program is written, not on the form in which it exists. Practically speaking, though, there are some tradeoffs.

Software is usually more elaborate and has more features, such as cropping of printed pictures. It is easier to operate; the user has friendly menus for selecting the way the picture will be printed. So far, available software will run under only one operating system, Apple DOS.

Using firmware, most of the cards can print graphics from all three operating systems for the Apple: DOS, Pascal, and CP/M. They allow graphics to be printed from within the user's program (in any of three operating systems). But, they must communicate with the card in a not-so-obvious shorthand code, for example, ^IGRDE2, to control printout.

In terms of cost, the price of a regular parallel card plus the graphics dump software program is roughly the same as the price of a graphics dump printer card, though the price on the graphics cards will probably drop. If you already own a regular parallel card it will, of course, be cheaper just to buy the software.

The following are good products that do what they are supposed to do with little, if any, fuss. The documentation ranges from adequate to excellent. In comparing them I think you should first consider the size of the graphics dump you want. Some of the products print only two sizes and may miss the size you want. Next consider the special features. Finally, check to see the product is compatible with CP/M or Pascal if you intend to use one of these operating systems.

Software Graphics Packages

I will start with the software packages: *Image Printer*, *Zoom Grafix*, *Graphtrix*, and *Enhanced Graphic Software*. All four will print either graphics screen in varying sizes and are good buys.

Some allow you to crop the image you are printing. That is, you can select any rectangular section of the graphics screen and the printer will print only that portion. So, if you had an image of a face on your Apple screen, you could print a picture of just the eyes, using the cropping technique.

"I had this nightmare about my Apple's innards being devoured by medflies."

56page FREE catalog

Business Forms and Supplies for MICRO Computers

Save money. Your firm name and address printed on standardized, continuous checks, invoices, statements, letterheads and labels. Designed to work with programs from over 200 software sources . . . or program to our attractive forms yourself with guides provided. Full color catalog also has stock tab paper, envelopes, diskettes, many other supplies and accessories.

- **Quality products at low prices**
- **No "handling charges" or hidden extras**
- **Available in small quantities**
- **Money-Back Guarantee**

Fast service . . . buy direct by mail or
PHONE TOLL FREE
1 + 800-225-9550
(Mass. residents 1 + 800-922-8560)
8:00 A.M. to 5:00 P.M., ET

NAME PHONE
COMPANY
STREET
CITY, STATE and ZIP

Required to help us send you correct information:

SOFTWARE BRAND PACKAGE# ☐ Do own programming.
COMPUTER MAKE MODEL# ☐ Have not purchased yet.
YOUR LINE OF BUSINESS Number of employees.

14101

Nebs Computer Forms
12 South Street, Townsend, Massachusetts 01469
A division of New England Business Service, Inc.

CIRCLE 267 ON READER SERVICE CARD

INCREDIBLE SPECIAL

Apple* Marauder only $20.95
(retail 34.95)
OR
Atari* Ghost Hunter (Cass) only $17.95
(retail 29.95)
OR
IBM* Zork I only $23.95
(retail 39.95)
with any other purchase

Of course we're just as proud of our regular prices. And if you don't see what you want here, please call us and ask for it, or write for our free catalog.

APPLE*

	Retail	Only
Screenwriter II	129.95	99.95
Ulysses	34.95	27.95
Castle Wolfenstein	29.95	23.95
Graphics Magician	59.95	47.95
Wizardry	49.95	39.95
Knight of Diamonds	34.95	27.95
MasterType	39.95	31.95
Time Zone	99.95	79.95
Snack Attack	29.95	23.95
Borg	29.95	23.95
Cranston Manor	34.95	27.95
Apple Panic	29.95	23.95
Ultima	39.95	31.95
Ultima II	54.95	43.95
Atlantis	40.00	31.95
Deadline	49.95	39.95
Pinball (A2 PB1)	29.95	23.95
Microwave	34.95	27.95
Electric Duet	29.95	23.95
Kabul Spy	34.95	27.95
Swashbuckler	34.95	27.95
Minotaur	34.95	27.95
Choplifter	34.95	27.95
Frogger	34.95	27.95
Bag of Tricks	39.95	31.95
Marauder	34.95	27.95
Star Blazer	31.95	31.95
Cannonball Blitz	34.95	27.95
Dos Boss	24.00	19.20
Utility City	29.50	23.60

APPLE*

	Retail	Only
Zoom Graphics	39.95	31.95
Apple Speller	125.00	99.95
Microteck Bam (16K)	120.00	97.95
Microsoft Ram (16K)	195.00	155.95
Microsoft Softcard	395.00	315.95
Microsoft Prem. Sys.	775.00	619.95
System Saver (Fan)	89.95	71.95
Verbatim Datalife (10)	40.00	26.95
Home Accountant	74.95	59.95
PFS: Filing System	125.00	99.95
Wordstar (softcard)	375.00	299.95
General Manager	149.95	119.95
D.B. Master	229.00	179.95
VisiCalc 3.3	250.00	199.95

ATARI*

Canyon Climber D16K	29.95	23.95
Preppie (Cass)	24.95	19.95
Centipede Cart8K	44.95	35.95
Raster Blaster D16K	29.95	23.95
Caverns of Mars D16K	39.95	31.95

IBM*

Home Accountant +	150.00	119.95
Visicalc	200.00	159.95
Supercalc	295.00	235.95
Deadline	49.95	39.95
Temple of Apshai	39.95	31.95
Curse of Ra	19.95	15.95

Our Guarantee: if it doesn't boot, we will replace it free...

1-800-845-5147

Hours: Mon. thru Sat., 9-9

VISA MasterCard
We accept
Visa or MasterCard
Checks (allow 2 weeks)
Money Orders
C.O.D.

Add $2.00 for shipping & handling
$2.00 extra if Blue Label
$3.00 extra if C.O.D.
SC residents add 4% sales tax
Prices subject to change and availability

*IBM is a trademark of International Business Machines
*Apple is a trademark of Apple Computer Co
*Atari is a trademark of Atari

SOFTWARE CITY INC.™

Software City Inc
PO Box 12283
Columbia, South Carolina 29211
803-736-1683

FREE CATALOG

CIRCLE 278 ON READER SERVICE CARD

Table of software features.

	Sensible Software Image Printer	**Phoenix Software Zoom Grafix**	**Data Transforms Graphtrix**	**Computer Station Combined Enhanced Graphics Software**
Sizes (inches) of Full Screen Printout	3.2 x 3.9 6.4 x 7.8 6.4 x 11.7	2.3 x 2.7 2.7 x 4.7 2.3 x 5.4 4.7 x 5.4 5.4 x 7.0 6.4 x 7.8 6.4 x 11.7	1.7 x 2.4 2.7 x 4.7 5.4 x 7.0	2.7 x 4.7 5.4 x 7.0
Rotate Image	No	No	No	No
Print in Emphasized Mode	No	Only emphasized	Only emphasized	Small-No Large-Yes
Compatible with CP/M and Pascal	No	No	No	No
Compatible with Other Printers	NEC 8023	Anadex 9000, 9001 9500, 9501 Diablo Epson MX-70, 80, 100 IDS 440, 445, 460, 560 MBI 88G NEC 8023 ProWriter Qume Silentype Spinwriter Starwriter Xerox	Anadex 9000, 9001 9500, 9501 IDS 440, 445, 460, 560 Centronics 739 MPI 88G Silentype	Anadex 9500, 9501 Centronics 739 Diablo Datasouth IDS 440-560 NEC PC 8023 NEC Spinwriter Qume
How?	Separate Package	On Disk	On Disk	On Disk
Compatible Interface Cards	Apple Centronics CCS 7720A 7720B 7728 Epson APL Mountain Computer CPS Orange Micro-Grappler	Apple: Centronics, parallel serial and communication CCS: 7710, 7720, 7728 Epson: APL Mountain Computer: CPS Interactive Structures: EP-12 (Pkaso) SSM-AIO: Parallel and serial Tymac parallel	Only parallel cards Apple: Parallel and Centronics CCS 7728 Epson: APL Mountain: CPS Tymac Parallel SSM-AIO	Apple: Parallel and Centronics Super Serial CCS: 7710A, 7720 7728 Mountain: CPS (Parallel) Computer Station: Station Master
Cropping How?	Yes Easy Cursor Controls	Yes Specify coordinates	Yes-Only horizontal Specify coordinates	No

All these programs assume that you are within Apple DOS. Basically, any image you can capture in an Apple DOS binary file can be printed with these programs. This is not as great a limitation as it might seem.

The picture I used to test these different products was the image of a chess position taken from the *Sargon II* chess program. I reset the Apple when I had reached to position I wanted to print, then booted a system master disk. This left the graphics screen intact.

From there I just used the BSAVE command to save the screen to disk. (BSAVE NAMEOF.PIC, A$2000, L$2000 for hi-res screen 1; BSAVE NAMEOF.PIC A$4000, L$2000 for screen 2.) With a bit of hacking, which is fun and educational, you can save pictures from many programs with graphics, and then print them out on your Epson.

Image Printer by Sensible Software

Let's start with my favorite of the group. What makes this program such a winner is ease of use. Sensible Software is quite sensible when it comes to making things easy for the user. I was able to breeze through this program on the menus alone.

Best of all, cropping an image from the hi-res screen is a snap. You just move a pair of crosshairs around the screen using the I-J-K-M diamond to mark two opposite corners of the rectangle you want. The other programs require that you specify the x and y coordinates of the area you want, which is several times more tedious.

Zoom Grafix by Phoenix Software

Although not as easy to use as *Image Printer*, *Zoom Grafix* is the most flexible of all the packages. You can directly control the ratio of horizontal dots to vertical dots. Thus you can print graphics in more different sizes than any of the other products reviewed here (though some of the sizes will be distorted like the image in a fun house mirror).

You really can "zoom" in a small portion of the graphics screen and blow it up on your printer—a very fine effort from Phoenix Software.

Graphtrix by Data Transforms

Graphtrix does not have the fancy cropping of *Zoom Grafix* and *Image Printer*—in fact, you can crop only horizontally off the top or bottom—but it does have a few tricks of its own.

With *Graphtrix* you can print the smallest version of the graphics screen: about one inch square. At this size the dots tend to blend together, and that "blocky" look that occurs in the higher magnifications

WE WILL NOT BE UNDERSOLD

SOFTWARE

MICROPRO	
Wordstar	$239.00
Mailmerge	89.00
Customization Notes	$359.00
Spellstar	$239.00
Datastar	$199.00
Calcstar	$199.00
MICROSOFT	
Basic Interpreter	$349.00
Basic Compiler	$389.00
Fortran 80	$499.00
Cobol 80	$695.00
DATA BASE	
FMS80	$595.00
dBase II	$599.00

NEW! IBM PC SOFTWARE NEW!

INFORMATION UNLIMITED	
Easy Writer	$289.00
Easy Speller	$149.00
Easy Filer	$319.00
VISICORP	
Visicalc 256K	$199.00
VisiDex	$199.00
VisiFile	$229.00
VisiTrend/VisiPlot	$229.00
MICROPRO	
Wordstar	$239.00
MISCELLANEOUS	
Supercalc by Sorcim	$229.00
Superwriter by Sorcim	$289.00
Home Accountant Plus	$139.00
ENTERTAINMENT	
Deadline	$39.00
Temple of Apshai	$29.00
Curse of Ra	$15.99

Call For More IBM Software And Accessories

DISK DRIVES

CCI 100 for the TRS-80 Model 1	
5¼ 40 track	$299.00
CCI 189 for the Zenith Z-89	
5¼ 40 track	$379.00
CORVUS 5M with Mirror	$3089.00
CORVUS 10M with Mirror	$4489.00
CORVUS 20M with Mirror	$5389.00
CORVUS Interfaces	CALL
RANA SYSTEMS add-on Disc Drive for the Apple II	
Elite One 40 Track	CALL
Elite Controller	CALL
Elite Two 80 Track	CALL
Elite Three 80 Track double-sided	CALL

DISKETTES

Maxell 5¼ single side	$39.00
Maxell 8 single side	$49.00
Maxell 5¼ double side	$45.00
Maxell 8 double side	$55.00
BASF 5¼	$26.95
BASF 8	$36.00
Verbatim 5¼	$26.95
Verbatim 8	$36.00
Wabash 5¼	$24.95
Wabash 8	$29.95

IBM PC ACCESSORIES

64K Card by Microsoft	$435.00
Joystick by T & G	$49.00
128K Card	$579.00
192K Card	$629.00
256K Card	$699.00
Combo Card by Apparat	$249.00

Call for more IBM PC add-ons

For fast delivery, send certified checks, money orders, or call to arrange direct bank wire transfers. Personal or company checks require one to three weeks to clear. All prices are **mail order only** and are subject to change without notice. **Call for shipping charges.**

APPLE SOFTWARE

MICROPRO	
Wordstar	$199.00
MailMerge	$89.00
Spellstar	$149.00
DataStar	$199.00
Calcstar	$189.00
Supersort I	$159.00
VISICORP	
VisiCalc	$199.00
VisiTerm	$79.00
VisiDex	$199.00
VisiPlot	$169.00
VisiFile	$199.00
VisiSchedule	$259.00
VisiTrend/Plot	$239.00
VisiPac	$539.00
MISCELLANEOUS	
Micro Courier	$219.00
Screen Director	$129.00
Executive Briefing System	$169.00
Supercalc	$199.00
Personal Filing System	$115.00
PFS Report Writer	$75.00
Word Handler	$169.00
CP/M Power	$59.00
ENTERTAINMENT	
Wizard and Princess	$29.00
Twerps	$28.00
Beer Run	$28.00
Zork I, II	$26.95
Deadline	$39
Chop Lifter	$24.95
Pinball	$24.95
Cannonball Blitz	$29.95
Knights of Diamonds	$29.95
Midnight Magic	$32.00
Wizardry	$45.00
Time Zone	$79.00
Tuesday Morning Quarterback	$24.95
Crush, Crumble & Chomp	$24.95
Datestones of Ryn	$15.99
Morloc's Tower	$15.99
Star Warrior	$31.99
Snack Attack	$23.95
Star Blazer	$24.95
Kabul Spy	$29.95
Cyclod	$23.95

APPLE ACCESORIES

ADVANCED LOGIC	
Add-Ram 16K Card	$99.00
Z-Card CP/M for the Apple II	$225.00
Smarterm 80 Column Board w/Softswitch	$249.00
The Synergizer	
All of the above plus "The CP/M Handbook"	$545.00
Z-80 Card by Microsoft	$319.00
16K Card by Microsoft	$159.00
32K Card by Saturn	$199.00
Keyboard Enhancer II by Videx	$125.00
Videoterm by Videx	$259.00
Game Paddles by TG	$49.00
Joystick by TG	$49.00
Numeric Keypad by Keyboard Co.	$139.00
ALF 9 Voice Board	$159.00
ALF 3 Voice Board	$229.00
System Saver by Kensington	$75.00
Versacard by Prometheus	$229.00
8088 Card by Coprocessor	$789.00
Microbuffer II 16K w/graphics	$259.00
Microbuffer II 32K w/graphics	$299.00
APPLE INTERFACE CARDS BY CCS	
Serial Asynch. #7710	$139.00
Serial Synch.#7712	$149.00

Call for other CCS cards

RAM

16K Ram Kit for Apple II; TRS80 200 nano seconds, 4116 chips	$17.50

COMPUTERS

CALIFORNIA COMPUTER SYSTEM	
Mainframe 2200a	$485.00
Z-80 CPU 2810a	$265.00
64K RAM 2065	$569.00
Floppy Controller 2422a	$359.00
ZENITH	
Z-89 48K	CALL
Z-90 64K	CALL
Call For Prices On The Complete Zenith Line	
CASIO FX702P Pocket Computer	$179.00
Sanyo MBC 1000 64K	CALL
Call For Prices On Complete Sanyo Computer Line	

PRINTERS

NEC 7710 Serial	$2395.00
NEC 7720 KSR	$2749.00
NEC 7730 Parallel	$2395.00
NEC 3510 Serial	$1850.00
NEC 3530 Parallel	$1850.00
NEC 8023 Dot Matrix 100cps	$539.00
Olivetti DY211 Letter Quality	
Daisy Wheel Printer	$1095.00
Parallel Only	$995.00
Epson MX-80	CALL
Epson MX-80FT	CALL
Epson MX-100	CALL
IDS 560	CALL
IDS Prism 80	CALL
IDS Prism 132	CALL
Okidata Microline 80	CALL
Okidata Microline 82A	CALL
Okidata Microline 83A	CALL
Okidata Microline 84	CALL
Centronics 739	$675.00
Datasouth 180 cps	CALL
Zenith Z-25 150 cps	CALL

MONITORS

Amdek 12" B & W	$109.00
Amdek 13" Color	$329.00
Sayno 9" B&W	$135.00
Sanyo 9" Green	$140.00
Sayno 12" B&W	$179.00
Sayno 12" Green	$189.00
Sanyo 13" Color	$359.00
Zenith 12" Green	$95.00
Zenith 13" Color	$339.00
Electrohome 13" HI-RES Color Monitor	$829.00
Electrohome 13" Color	$349.00
Electrohome 12" B&W	$179.00
Electrohome 12" Green	$189.00
Electrohome 9" B&W	$149.00
Electrohome 9" Green	$159.00

SPECIAL OF THE MONTH
RANA SYSTEMS
add-on disk drive for Apple II
Elite One 40 track CALL

TERMINALS

ADDS Viewpoint	$495.00
Zenith Z-19	$679.00
Televideo 910	$595.00
Televideo 925	$779.00
Televideo 950	$969.00

TELECOMMUNICATIONS

Prentice Star Modem	$129.00
Novation Cat Modem	$139.00
Novation D-CAT	$149.00
Novation AUTO-CAT	$199.00
Novation APPLE CAT	$299.00
Hayes Smart Modem	$249.00
Hayes Micro-Modem	$295.00
Hayes Chronograph	$225.00

The CPU Shop

master charge
THE INTERBANK CARD

VISA

TO ORDER CALL TOLL FREE 1-800-343-6522
420-438 Rutherford Ave., Dept. CR11 Charlestown, Massachusetts 02129

Hours 9 AM – 9 PM (EST) Mon.-Fri. (Sat. till 6)
Technical information call 617/242-3361

TWX- 710-348-1796

Massachusetts Residents call 617/242-3361
Massachusetts Residents add 5% Sales Tax

CIRCLE 159 ON READER SERVICE CARD

Table of interface card features.

	Practical Peripherals Microbuffer II	**Computer Station Station Master**	**Genie Computer Corp. Genie Card**	**Interactive Structures Pkaso**
Sizes (inches)	2.6 x 4.8 6.5 x 7.8	2.6 x 4.8 5.4 x 7.0	2.6 x 4.8 6.5 x 7.8	2.6 x 4.8 3.7 x 3.2 6.5 x 7.8 w/MX-100 also 2.7 x 4.7 5.3 x 9.3
Rotate Image by 90°	Yes	No	Yes	Yes
Print in Emphasized Mode	Yes	Small image-no Large image-yes	Yes	Yes
Compatible with CP/M and Pascal	Yes	Needs patch to work with CP/M	Yes	Yes
Compatible with Other Printers	IDS NEC Okidata	NEC 8023 Centronics 739 Anadex 950	NEC C.Itoh Anadex IDS	Okidata IDS Centronics
How?	Different ROMs	DIP switches on card	Different ROMs	Different ROMs
Cost	w/16K RAM $260 w/32K RAM $300	$175	$135 w/o Graphics $159 w/ Graphics	$165
Comments	On-board RAM allows buffering of text or graphics so Apple can be used while printer prints.		Also has several commands for formatting text. Will do a text screen dump	Most sophisticated range of features • Lo-res and halftone graphics • User defined special characters • Super-res (2160 x 960) dots per page

is eliminated. Placed in an upper corner, such a picture could be used to create fine personalized stationary.

In fact, *Graphtrix* images are meant to be juxtaposed with text. *Graphtrix* is designed to dovetail with *Applewriter* so that you can combine text and graphics on the same page. *Graphtrix* will also handle footnotes. The *Graphtrix* manual is printed on an Epson, using *Applewriter* and *Graphtrix*.

So *Graphtrix* is the package to get if you want to embed printed graphics in text. As a screen dump it is fine too. Data Transforms generously allows you to include the screen dump as a subroutine in your own Applesoft programs.

Combined Enhanced Graphics Software

Computer Station produced one of the first (if not *the* first) printer graphics programs for the Apple. Initially they had separate packages for different printers. Now they have bundled all these separate programs together (and added a few more for the newer printers) into one package. *Enhanced Graphics Software* (EGS) is your basic screen dump in two sizes, normal (4" x 3") and expanded (7" x 5"). It is a solid product—good menus, easy to operate.

As with *Graphtrix*, Computer Station has provided instructions so that you can use the graphics printout as a subroutine in a Basic program.

My one criticism is that the documentation comes on several sheets of loose-leaf paper and presumes that you will buy one of the notebooks that Computer Station sells to contain them.

Interface Cards With Special Firmware

Now we move to consider several printer interface cards: the Microbuffer II, the Genie Intelligent Printer Interface, Station Master, and Pkaso. The first three cards are very similar—they provide two sizes of graphics dump and are controlled by almost identical codes. The Pkaso board has many more options and very different control codes. Except for the Station Master all these boards work with CP/M and Pascal, as well as Apple DOS.

Station Master by Computer Station

The graphics dump from this card is the same as the one you get from Computer Station's *Enhanced Graphics* program described above. The control codes for a Station Master graphics dump begin with CONTROL-IG, followed by optional modifiers. The codes for the Microbuffer and the Genie board are about the same.

The large size dump is 5.4" x 7.0" which I think looks better than the 6.5" x 7.8" large dump produced by the other boards. A slight glitch: the large dump is printed in emphasized mode (darker) and the normal size dump is in normal mode. (This is also true of the *EGS* program.)

The Station Master will print text and graphics from CP/M but requires a patch to the CP/M BIOS to do so. For printing graphics from Pascal, Computer Station has thoughtfully included in their documentation the code for a working program that can be easily adapted as a procedure in the user's own programs.

WIN $5,000 Plus Royalties!*

For the best Talking Game

For the Atari® or Apple®II+

Using the VOICE BOX™ Speech Synthesizer

VOICEBOX
SPEECH SYNTHESIZER
THE ALIEN GROUP
MADE IN NEW YORK CITY, USA
Speech Synthesizer for Atari

Now you can make your Atari® 400/800 or Apple® II games and other programs come alive with the VOICE BOX by the Alien Group — the first low-cost, smart speech synthesizer with unlimited vocabulary.

Add jokes to your programs. Insults. Compliments. Help messages. Stories. Alien voices. Animal roars. Have your computer talk to the fire department or police in emergencies. To kids. Or blind people. Teach touch typing with immediate spoken feedback. Or just about any other subject — the fun way. Or help a speech-impaired friend communicate . . . the possibilities are limitless.

The VOICE BOX plugs into your Atari's serial port. And talks directly through your TV set. Or into any Apple II slot. No power supply or special interfaces needed.

Just select from its simple screen menu. A dictionary with thousands of common words (on diskette or cassette) automatically translates your text into speech. It's that easy.

But don't let its friendliness fool you. The VOICE BOX has all 64 phonemes (basic sounds, like "ah") built in. So you can precisely create any word or sound you can imagine. And store it all on diskette or tape. Names or foreign language words, for example. Or wierd non-human languages.

Let me entertain you — The VOICE BOX is creative too. It will crack you and your friends up with non-stop random, grammatically correct sentences, using words you specify. It also has an amusing talking face with lip-sync animation — a real crowd-stopper. Best of all, you can call the VOICE BOX from any BASIC program and make your program really hum —literally!

Singing Apples? — Apple owners get all these capabilities too — as a plug-in card plus diskette. Or there's a deluxe version with the dictionary in ROM (no diskettes to bother with), speaker, and ability to "sing" (hey we're not making this up folks) in any key. (Both Apple versions require 32K or more. Applesoft and DOS 3.3).

Don't confuse the VOICE BOX with "dumb" speech synthesizers that can't learn new words. Or software-based ones with lower speech quality — and an annoying tendency to blank out the display when they talk. The VOICE BOX is a true breakthrough in speech synthesis. Small wonder thousands of Atari and Apple owners have already bought the VOICE BOX.

The VOICE BOX is available now at leading computer stores throughout the world. Or direct from the Alien Group, with 10-day money back guarantee if you're not completely satisfied.

VOICE BOX For Atari. $169.00
16K and 32K versions included
(Specify diskette or cassette).

VOICE BOX for Apple II.+ $139.00.
(Requires speaker.)

VOICE BOX for Apple II+. $215.00
(Includes dictionary in ROM and singing capability. Comes with speaker.)

Enclose check or money order, Visa or Mastercard #. Please include expiration date.

CHECK YOUR LOCAL COMPUTER STORE FOR TALKING "VOICE BOX" VERSIONS OF YOUR FAVORITE GAMES FROM LEADING GAME COMPANIES

*Win a $5,000 prize — plus royalties — for the best Atari 400/800 or Apple II+ game using the VOICE BOX. Deadline: May 30, 1983. Write for contest details.

Please mail to: The Alien Group, Department CC-4 , 27 W. 23 St., N.Y., N.Y. 10010
Or call in order to (212) 741-1770

CIRCLE 104 ON READER SERVICE CARD

Atari is a registered trademark of Atari Inc. Apple is a registered trademark of Apple Computer, Inc. VOICE BOX is trademark of the Alien Group

SUPER VALUES

MINI DISK TRAY

Store over 130 mini-disks in their protective jackets. Each plastic tray includes a smoke dust cover and six plastic movable index dividers.
SIZE: 6"x6"x12"
COLORS: Black or putty
ADD'L DIVIDERS: $4.95/6 pack.
PRICE: ~~$29.95~~ $24.95

apple software

GIN RUMMY: The APPLE is good in this superb HI-RES game! **$16.95**

OTHELLO: Nine skill levels makes this fast HI-RES game fun! **$17.95**

BLACKJACK: Up to four players can challenge the APPLE in this fast HI-RES game. **$14.95**

STATES & CAPITALS: Learn them with the aid of a HI-RES map. **$13.95**

MEMORIZER: HI-RES objects are used to challenge the players memories. **$15.95**

SPEED READING: Read it fast! It self-adjusts to your skills. **$14.95**

UPDATE 3.2/3.3: Your 3.2 disk is updated in seconds to boot on both 3.2 and 3.3. **$17.95**

VISIFORM: Lists VISICALC grid locations and their formulas. A MUST for VISICALC users! **$17.95** *

CATALOGUER: Organize your disk library by program name automatically! Sort, search, add titles, comments, etc. It includes a powerful editor! **$18.95** *

HI-RES DRAWING: Draw HI-RES screens from game boards to business charts. Has 50 different size brushes or define & use your own brushes! **$17.95**

HI-RES SHAPE GENERATOR: Create & EDIT shape tables for use in your programs. It's easy to use! **$15.95**

CONCENTRATION: Challenge your memory in this beautiful HI-RES card-matching game! **$10.95**

BACKGAMMON: Strategy & odds makes this a great HI-RES game. **$16.95**

ROYAL CASINO: A HI-RES card game of considerable math skill. Great! **$15.95**

STUD POKER: You VS the APPLE in a HI-RES gambling game. It's fun! **$15.95**

CRIBBAGE: Six-card version in beautiful HI-RES. **$15.95**

UTILITIES I: Includes: AUTO-MENU, Sort Catalog, Change Volume Name and Short DOS Commands. **$16.95**

WORD SEARCH PUZZLE: Find the hidden word before time runs out. It's educational & fun! **$14.95**

SCRAMBLED WORDS: Clues help you to unscramble them in this timed educational game. **$14.95**

* Specify DOS 3.2 or DOS 3.3.
All programs are on disk.
Applesoft is required.

FREE SHIPPING
send check or money order to:

SoftwareLand

Tamiami Mall
8774 S.W. 8 Street
Miami, Fla. 33174
(305) 551-1111

CIRCLE 282 ON READER SERVICE CARD

Apple Cart, continued...

Genie Intelligent Printer Interface by Genie Computer Corp.

The Genie card includes a rotate command that will rotate an image 90 degrees clockwise. This is necessary when printing the large size graphics dump. In addition to the graphics dump, the Genie card includes a text screen dump and several text formatting commands. You can set your margins, line length, and page length with CONTROL-I commands.

This card works so well with all three operating systems that you hardly notice it, which is exactly the way it should be with interface cards. The Genie card is available in versions compatible with other printers (IDS, NEC, Okidata, etc.).

Microbuffer II by Practical Peripherals

The Microbuffer is also an excellent card with all the features of the Genie interface plus the ability to add 16K or 32K of RAM to the board. This additional memory acts as a buffer between the Apple and the printer.

Normally the Apple must send data to the printer a line at a time, then wait while the printer prints it. With the Microbuffer the Apple dumps its output into the buffer, then moves on to other tasks.

You can load the 32K buffer with four graphics screens, and instead of having to wait, you can return to programming or whatever while the Epson chugs through the four pictures. This buffer also works for printing text. Like the Genie card, the Microbuffer will work with other printers if the ROM chip is changed.

Pkaso by Interactive Structures

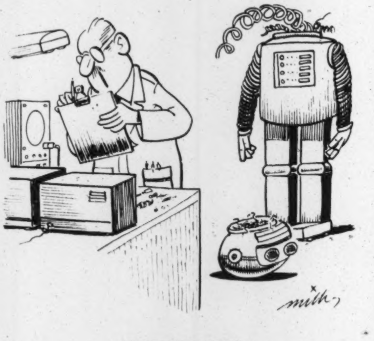
Of all the products considered here, the Pkaso is the most powerful. The Pkaso board itself provides five sizes of hi-res graphics dump, a lo-res graphics dump available in 16 shades of gray(!), text screen dump and text formatting control, and "SuperRes" dot graphics (960 x 792 points on 8.5" x 11" page). On disk you get to design your own special characters.

Pkaso is designed so that you can integrate these features into existing software for the Apple. Pkaso is even compatible with the Apple III. And best of all Pkaso has an excellent manual to explain the use of its wonders. Like the *Graphtrix* manual, the manual for Pkaso is printed on an Epson and speaks eloquently in form and content of Pkaso's power.

I am not sure everyone needs all these features, but the mountain is there if you want to climb it. As a simple graphics dump and parallel card, it is no more difficult to use than any of the others.

Conclusion

If you have an Epson with Graftrax, there are enough products that you are bound to find one that suits your desires for printed graphics. In fact, whatever printer you have hooked up to your Apple can probably print graphics with one of the items reviewed here. If not, wait a few months and someone will find a way. □



"GESUNDHEIT."

Firms Mentioned in This Column

Computer Stations Inc.
11610 Page Service Dr.
St. Louis, MO 63141
(314) 432-7019

Data Transforms, Inc.
906 E. Fifth Ave.
Denver, CO 80218
(303) 722-8774

Genie Computer Corp.
18720 Oxnard St. #108
Tarzana, CA 91356
(805) 497-1262

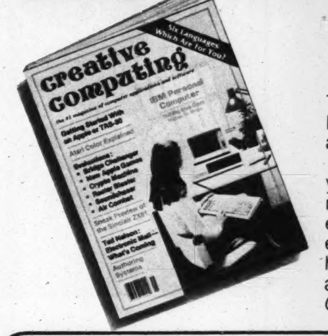
Interactive Structures, Inc.
112 Bala Ave., Box 404
Bala Cynwyd, PA 19004
(215) 667-1713

Phoenix Software, Inc.
64 Lake Zurich Dr.
Lake Zurich, IL 60047
(312) 438-4850

Practical Peripherals, Inc.
31245 La Baya Dr.
Westlake Village, CA 91362
(213) 991-8200

Sensible Software
6619 Perham Dr.
West Bloomfield, MI 48033
(313) 399-8877

7 Good reasons why you should subscribe to *Creative Computing.*



It's the Number One magazine of computer applications and software!

There's one place you can always be sure of learning more about microcomputer software and applications: *Creative Computing.*

Every month *Creative Computing* provides you with a continuing education on everything related to microcomputers and computer equipment. Useful articles, "how to" tutorials, exciting new applications, games and "no holds barred" reviews of the latest software and equipment make up a major part of *Creative Computing*'s editorial content.

We give you probing features on programming breakthroughs and important news. Plus in-depth articles on elementary, intermediate and advanced software and applications topics—to help you develop your knowledge and skills, save hundreds (perhaps thousands) of dollars in unneeded software, discover uses for your personal computer that you might never have considered. Articles that increase your overall "computer consciousness." Here's how:

1 *Creative Computing* gives you things to actually do with a computer.

Just owning a computer isn't enough. You've got to know what to do with it. That's why applications are our primary focus. Text editing, animation, graphics, business simulations, data base and file systems, music synthesis, control of household devices, communications, games—some of the applications and software you'll learn about in *Creative Computing.*

2 *Creative Computing* discusses business applications in simple, nontechnical language.

If you're a business person who needs to know about the latest developments in word processing and office applications, turn to *Creative Computing.* We clarify such business applications as investment analysis, futures evaluations, data base management, mailing list programs, text editing, word processing and simulations. And all the software available for business people.

3 *Creative Computing* helps you decide which computer equipment is best for you.

Our tough, no-nonsense equipment profiles arm you with the facts before you walk into a computer store. You'll know the right questions to ask and how to cut through the jargon and sales hype. We give you authoritative guidance in deciding what you need, what you don't need—and what's right for you and your pocketbook.

4 *Creative Computing* covers computer education in depth.

We started out as a computer education publication, and we're still committed to the educational community. We regularly carry articles on designing educational software, evaluating educational software, teaching concepts and terminology in computer education, text editing applications for literature and computer simulations in the classroom—plus a great deal more.

5 *Creative Computing* brings you hours of mind-expanding game entertainment.

We've got a soft spot for the computer game addict—and computer game software. We know you want to understand more about the new computer games flooding the market: which ones are easiest to learn? Require the most skill? Offer the most surprises? Give you the best graphics? Provide the most challenge? Contain a new twist? *Creative Computing* brings you the answers.

6 *Creative Computing* features the state of the art.

Columns on the most popular personal computers, a "software legal forum," letters to the editor. Reviews of books, games, organizations, dealers and events. Fascinating interviews with leading innovators, equipment designers, program developers and game inventors—men and women who'll give you a real glimpse of the future!

7 Our price is right.

By subscribing to *Creative Computing* now, you can save as much as 33% off the full subscription price. To learn elsewhere what you'll learn from *Creative Computing*, you might spend hundreds of dollars in course fees and books. Then you'd have to winnow out what you could use from all that you'd learned. But *Creative Computing* does that for you, so you'll have time to enjoy your own computing interests. And that saving of time makes this offer very inexpensive indeed.

Join over 150,000 *Creative Computing* readers by subscribing today! Just use the coupon at right.

SAVE UP TO 33%!

Creative Computing • P.O. Box 5214 • Boulder, Colorado 80322

YES! Send me *Creative Computing* for:

☐ One year (12 issues) for $19.97—I save 20%!
☐ Two years (24 issues) for $36.97—I save 26%!
☐ Three years (36 issues) for $49.97—I save 33%!

Savings based on full one-year subscription price of $24.97.

Check one: ☐ Payment enclosed. ☐ Bill me later.

Mr./Mrs./Ms.________________________
(please print full name)

8H153

Address____________________Apt.______

City________________________

State____________Zip____________

Offer valid in U.S. and possessions only. Please allow 30 to 60 days for delivery of first issue.

outpost : atari

John Anderson

It is a pleasure for me to man the outpost this month. It has been nearly three years now since I first unboxed my Atari 800, and I can report that it has performed unfailingly over all that time and heavy use. I'm not saying I have never had a system crash or lock-up, but the computer has never required any service beyond cleaning the board contacts once in a while (I can handle that).

The machine was and remains an engineering triumph, which is still ahead of its time in terms of capability and cost, as well as reliability.

Atari owners have had to be a tough-skinned breed now and then over the past three years, but that has changed. The "big three" are under the gun. Atari owners, now numbering over 300,000, know they made the right decision.

I am a member of this group, and a satisfying facet the hobby offers to me is the use of my machine to communicate with others who feel the same way I do about it: that the Atari is the best machine of its class, and that learning its secrets is an extremely pleasurable pastime.

Last May we instituted a call for reviewers, and many Atari owners responded. One thing that impressed all of us here at the magazine was our query concerning modems. Of the respondents who did not already use their microcomputers for telecommunication, nearly *everyone* responded that he had a modem on his "wish list," and that it wouldn't be long before he was hooked up. We have also had a very favorable response to the possibility of making *Creative Computing* downloads available over networks such as Compuserve and The Source. We are looking into this possibility.

The Modem Mystique

A great deal of potential presents itself. The possibilities of travel reservations, ticket purchases, shop at home services, a broad range of databases at your finger tips, are very exciting. Telecommunications herald a truly practical role for the microcomputer in the home.

I do not believe, however, that any of these practical notions constitutes the real basis for the "modem mystique." The thing that excites most people about microcomputer telecommunication is the opportunity to express themselves in a new medium, to tell others how they feel. They are less interested in using a modem to pay their bills than to state their opinions, to have their voices heard, and to respond to the voices of others.

The bulletin board service is growing in popularity. This is a phone line tied to a computer, running a program that accepts and displays information sent from other computers. The concept of the bulletin board is powerful and extensible. It creates a new kind of forum—a medium of communication—through which ideas can be expressed, shot down, modified, and spread. The importance of this kind of interaction, and its potential, is now being discovered. I think it may be a while before it emerges as a medium of major influence, but it *is* going to happen; it's happening now.

I maintain contact with about five Atari bulletin boards regularly. I enjoy leaving messages as well as reading what others have to say. I check the download files to see if there is any software worth trying out. I find out what other Atari owners are thinking about, as well as expressing my own thoughts. I may even start a "real-time" conversation with someone at the other end.

You may be a new user with questions concerning hardware. You may be an assembly language programmer wishing to share the results of a routine you have developed. Or, you may simply wish to voice your opinions concerning *Tron* or *E.T.* or to boast of your latest score at *Zaxxon*. The bulletin board is a worthwhile place to do it. Your thoughts join other thoughts, in what amounts to a marketplace of ideas—ideas that are shared.

Communication via computer may seem at first to be rather impersonal, but this is not the case. Through what other medium might you become involved in a lengthy philosophical chat with a sysop (system operator) hundreds of miles distant and at three in the morning? It is almost like being able to call your own user's group meeting whenever the mood strikes you—and then adjourn it without muss or fuss. It is at once personal and yet distant: and therein lies its unique value.

So get that Atari of yours talking to other Ataris, the way you've planned.

The Forth Wave

A very hot topic on nearly every board I have logged onto lately is the Forth language. This language offers hope to folks frustrated by the slowness of Basic, limitations of Pilot, bugs in APX Pascal, and obscurity of assembler. Although it has its own unique little quirks, Forth seems to be a natural for the Atari machine.

There are many implementations of the language available for the Atari, but the definitive version now seems to be Valforth, from Valpar International, 3801 E. 34th Street, Tucson, AZ 85713. We have received four packages from them, each of which shows a high level of professionalism and promise.

Valforth is a debugged and improved version of APX Forth, and is available with a powerful screen editor and utility package; a player missile graphics package, character and sound editor; and a display list formatter. We were able to create very smooth multicolored player/missile animation as well as modified

Get Omni quality for as little as $1.99... even if all you want is a 10 pack.

Call toll-free for great savings on Omni's complete line of 5¼″ premium disks. Each is certified error-free at a minimum of twice the error threshold of your system. Each is rated for more than 12 million passes without disk-related errors or significant wear.
And each is precision fabricated to exceed all ANSI specifications with such standard features as reinforced hub rings and Tyvec sleeves. Get same day shipment and an unconditional, no hassle money-back guarantee.

ARCHIVE

152 Boston Turnpike
Shrewsbury, MA 01545
(800) 343-0314; In Mass:
(617) 756-2960

Disk No.
OMNI
Copyright © 1981 by Omni Resources
Description

Call for 8″ disk prices.

Call toll free (800) 343-0314 In Mass: (617) 756-2960

Call if you're not sure which disk is compatible with your system. Call for prices on 96 tpi and special formats. We offer an unconditional money-back warranty. We're here to help.

Be sure to indicate system name and model # at right.

# of 10 Packs	5¼″ Disks	Price Per 10 Pack	Total Price
______	Single side/single density	$19.90	$______
______	Single side/double density	$23.90	$______
______	Double side/double density	$39.90	$______
______	Flip/Floppy reversible Double side/double density	$39.90	$______
______	Protective plastic library case (in lieu of soft storage box)	$ 2.99	$______
	Shipping and handling		$ 2.00
	5% sales tax (Mass. only) Add 40¢ per 10 pack		$______
		Total	$______

☐ Check
☐ COD
☐ Master Card
☐ VISA

Card # ______________________ Exp. ______________

System and model # ______________________

Name ______________________

Address ______________________

____

Tel. ______________________

CIRCLE 112 ON READER SERVICE CARD

display lists with very little fuss. The speed of movement is not as fast or as smooth as machine code, but is many times faster than Basic, and quite acceptable—so are the ease with which these packages can be used, and their reasonable cost. I hope to present a thorough evaluation of all the Valpar packages in the near future.

Despite whatever you may hear to the contrary, you need not renounce your worldly ways to grasp Forth. Nor does mastery of Reverse Polish Notation cause hair loss or halting speech. Sure, the language has its peculiarities, but that's the challenge, right? Anyway, whenever you hit a real snag, you can ask for help on a bulletin board service! There's nothing like access to someone who knows the answers when you're trying to learn something.

Another byproduct of accessing user's group bulletin boards is the spreading of rumors. One such rumor I discovered on the MACE BBS has lamentably been confirmed: John Harris, brilliant young author of *Jawbreaker* and *Mouskattack*, had the only extant source code for his latest work, *Frogger*, stolen during a charity benefit. It is hard to understand what the thief had in mind—if we assume the thief had anything resembling a reasoning mind. What could he have hoped to gain by stealing the source code of an unfinished program? This will certainly forestall the release of *Frogger* for some months, and is sure to have put a real crimp into John's summer, if not his year. Upon capture, the thief should be forced to play Crystalware adventures to their solution or the thief's collapse, whichever comes first. (Are you taking any bets?)

Other Atari Bulletin Boards

R=Ringback L=Limited service

Type	Name	Location	Phone
AMIS	—	Atlanta, GA	404-252-9438
AMIS	APOGEE	Miami, FL	305-238-1231-RL
AMIS	—	Baton Rouge, LA	504-273-3116
AMIS	ARCADE	Detroit, MI	313-978-8087-R
AMIS	—	Chicago, IL	312-789-3610
AMIS	GRASS	Grand Rapids, MI	616-241-1971
AMIS	MACE	Detroit, MI	313-868-2064
AMIS	MLBBS	Madison, WI	608-251-8538
AMIS	SB-12	Boston, MA	617-876-4885-L
AMIS	SPACE	Seattle, WA	206-226-1117
AMIS	TEAM	San Jose, CA	408-942-6975-L
ARMU	ARMUDIC	Washington, DC	202-276-8342
ARMU	FLEGLG	New York, NY	212-598-0719-L
ARMU	GREKLCOM	Oklahoma City, OK	405-722-5056
ARMU	PACE	Pittsburgh, PA	412-655-3046
ATBBS	—	Honolulu, HI	808-833-2616
TARI-BOARD	—	Denver, CO	303-221-1779
TARI-BOARD	—	Atlanta, GA	404-252-9438
CBBS	CP/M	Detroit, MI	313-759-6569-R
RBBS	CP/M	Allentown, PA	215-398-3937
RBBS	CP/M	Chicago, IL	312-789-0499

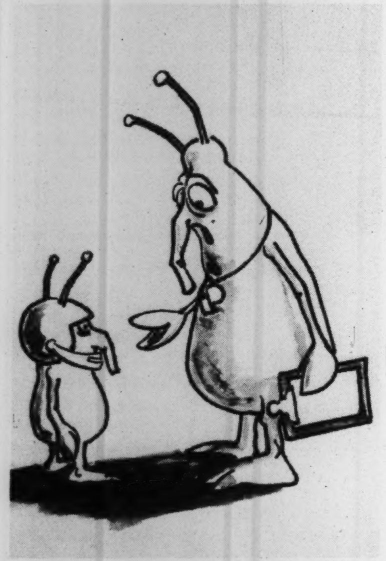
The "type" of bulletin board indicates what program is run on the host computer. Each program has its own strong and weak points; ergo each has its own adherents and detractors. It's all part of the fun.

AMIS stands for "Atari Message and Information Service." ARMUDIC began as a mnemonic for the phone number of the original service.

"Ringback" means to let the phone ring once, hang up, count to five, and redial. This allows a single line to serve as a voice and modem connection.

"Limited service" means the board is up only part-time, as opposed to 24 hours a day. If you can connect once, the hours will be listed for you.

These numbers were compiled by the MACE BBS, which is one of the most popular Atari boards in the country. Our thanks to the Michigan Atari Computer Enthusiasts for this list. Give them a call!



"First you lull them into a false sense of confidence with a couple of perfect runs..."

Poking Around

I have yet to see a *definitive* list of memory locations for the Atari in any manual, periodical or book. We are compiling a list currently, and it will appear soon in the pages of *Creative Computing*. In the meantime, here is a very brief collection of some of the most interesting locations, and what values to POKE them with (all values in decimal):

65 - if = 0, I/O data transfer tones from TV or monitor will be disabled. Load will take place in silence. Nice with titles or especially music, to suppress "noise." If location 65 ⟨ ⟩0, I/O will be audible.

77 - if = 0, attract mode will be suppressed. It is surprising to me how many programs are missing this simple POKE in any loop of less than nine minutes duration. Although designed to prevent "burn-in" on an unattended machine, this mode drives me nuts. If location 77 = 128, attract mode is enabled without nine-minute clock countdown.

752 - if = 0, makes the cursor "invisible." I say invisible rather than disabled because the cursor still functions as if it were visible. Nice in title cards and text programs to clean up screen "look." If location 752 ⟨ ⟩ 0, cursor will be visible.

82 - if = 0, enables 40-column screen width. The Atari defaults to a 38-character screen width, which was a good thing for me when I used a regular color television with the computer. "Overscan," as it is called, cut off the left-hand side of the screen. When I upgraded to a color monitor (much to my wife's relief), I noticed two unused columns on the left side of the screen. A simple POKE brings them into play. If location 82 = any number from 0 to 39, that number becomes the left-hand column. The default value is two.

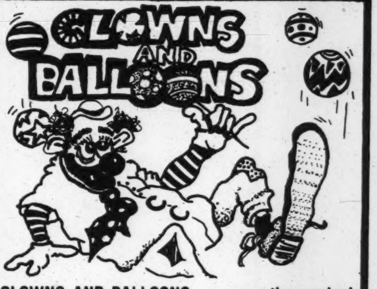
83 - Same as above but for right-hand margin. Default is 39. Less call for this one, but nice to know, anyhow. Right?

Royal Software

YOUR MARKETPLACE FOR:

*ATARI

WE DEAL EXCLUSIVELY IN PRODUCTS
FOR THE ATARI (THE BEST) COMPUTER



CLOWNS AND BALLOONS . . . an action-packed arcade game that'll make you want to join the circus.

16K DISK or TAPE $26.90

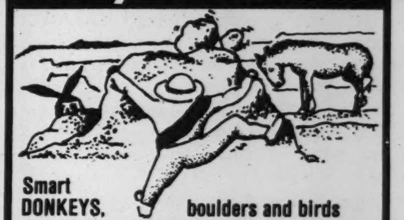
HARDWARE

800 Computer 16K	$648
800 Computer 48K	$757
400 Computer 16K	$288
400 Computer (used)	$199
810 Disk Drive	$448
850 Interface	$178
410 Recorder	$ 78
MX 80FT/Plus	$588
16K Ram module	$ 69
32K Ram module	$109
Percom Disk Drive	$648
Graphics Tablet	$269
10 Blank Disks	$ 28
Track Ball Controller	$ 63
Wico Joystick	$ 26
800/400 Dust Cover	$ 9
48K Ram module	$197

SOFTWARE

PAC MAN (cart)	$39.50
Centipede (cart)	$39.50
Microsoft Basic (D) 32K	$79.10
Macro Assembler Edit. (D)	$79.10
Ghost Hunter (T) 16K	$29.95
Ali Baba (D) 32K	$28.90
Rear Guard (T) 16K	$17.90
Track Attack (D) 48K	$26.90
Threshold (D) 40K	$33.90
GORF (D) or (cart.)	$35.10
Crypts of Terror (D,T) 16K	$26.30
Choplifter (D)	$31.40
Cactus League Baseball(D)	$17.90
De Re Atari book	$17.90
Atari Games Book	$13.90
Megalegs (D,T) 16K	$31.40
BookKeeping Pkg. (D) 40K	$67.50
Eastern Front (D,T) 16K	$27.90
Bug Attack (D,T) 32K	$26.90
Pacific Coast Hwy (D,T)16K	$26.90
Alien Swarm (T) 16K	$26.90
Midnight Magic (D) 48K	$31.45
Intruder (T) 16K	$26.90
Nautilus (D,T) 32K	$20.20
Protector (T) 32K	$22.45
Preppie (T) 16K	$22.45
Ghost Encounters (D,T)16K	$26.90
Shamus (D,T) 16K	$26.90
Pool 400 16K	$36.90
Caverns of Mars (D) 24K	$33.90
Lockpik (D) 24K	$44.90

Canyon Climber



Smart DONKEYS, boulders and birds dropping rocks try to stop you from reaching the top. A real challenge. Arcade quality.

16K
DISK $26.90 TAPE $22.40

Descend through mazes into the Dungeons with your squadron of warriors to battle with visible and invisible monsters.

Wizard of Wor

$35.10 16K Cartridge
24K Disk

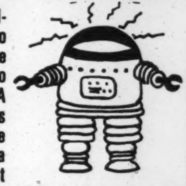
CROSSFIRE

The aliens have landed and it's your job to save the city. (If you can!) TOP RATE GAME, ARCADE QUALITY, HI-RES Graphics & Sound.

16K TAPE
32K DISK

$26.90

INTRUDER



A secret research installation is protected by two robo-units whose one purpose in life is to destroy all intruders. A major earthquake has struck this region. The "hot room" is a shambles! A meltdown at the installation is imminent! Your job is to guide a repair robot into this area and avoid being caught by the mad robo-units.

16K
$26.90 TAPE
$31.40 DISK

FROGGER

This is the genuine FROGGER game that you see in the arcades. Made by the same people that made Jawbreaker (One of the top ten sellers.)

$31.40 16K Tape
32K Disk

Call or Write for

FREE

ATARI PRODUCTS CATALOG
with hundreds of items

VISA master charge **TO ORDER CALL TOLL FREE 800-452-8013** FOR INFORMATION CALL 503-683-5361

HOW TO ORDER: Send check or money order or call our toll free number and use your Visa Card. Shipping on software is $2.00 per order anywhere in USA. Hardware shipping call for cost. Add 3% for VISA or MC. Equipment subject to price change and availability without notice.

Store Hours
8 am — 6 pm
Mon. — Sat.

Royal Software
2160 W. 11th Ave.
Eugene, Oregon 97402

* Atari is Trademark of Atari Inc.

CIRCLE 268 ON READER SERVICE CARD

Outpost: Atari, continued...

Third party game software for the Atari 400/800 computers continues to pour in to the magazine. Let's take a look at just a part of the cream of the latest crop:

A Very Grand Canyon

Datasoft was among the first commercial third-party sources of Atari software, and the quality of their product line has remained consistently high. *Canyon Climber*, by Tim Ferris, sets a new standard for Datasoft, as well as one that challenges comparison.

Beginning with strains of Bach, *Canyon Climber* sets its own tense, yet humor-filled pace. The musical opening is superb; it is hard to tell whether you are listening to your computer or a cut from the album "Switched-On Bach." How Ferris manages the tone sustain is a mystery to me.

Suddenly the music vanishes, and your lone figure is left, clinging to a narrow canyon trail while dozens of surly, half-crazed billygoats seek to topple him from the precipice.

You are without weapons in your attempt to scale the many paths and ladders. Your only edge is a near ballet-like ability to leap into the air. If you time your leaps just right, you can hurdle goats on the fly. Your timing is crucial, of course; beginners will almost certainly earn a lot of horns in the keester.

The first task is to place explosive charges across a set of bridges spanning the canyon. Dodging oncoming goats from all sides, your fearless climber scales the sheer cliffs. And, upon reaching the detonator, you blow the bridges. This will hold the billygoats for a while.

However your problems are just beginning. The screen changes, and you find yourself at the foot of another set of cliffs.

Billygoats were child's play. Here you meet a very sedate group of Indians: they neither move nor make a sound. They simply and continuously shoot arrows at your face. Hope you've been practicing your pirouettes.

creative computing

SOFTWARE PROFILE

Name: Canyon Climber

Type: Arcade game

System: Atari 400/800 16K

Format: Cassette/disk

Language: Machine

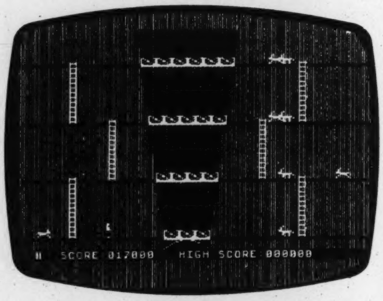
Summary: You'll want to gorge yourself

Price: $29.95

Manufacturer:
Datasoft Inc.
19519 Business Center Dr.
Northridge, CA 91324

At a couple of these cliffs you will find a shield, which may help fend off a few arrows. Be careful though, because your shield may disappear at any time. Carrying it also makes ladder climbing tougher, as you cannot climb a ladder while carrying a shield.

If you are lucky enough to make it past the Indians, you are greeted by a final set of cliffs. You can see the top now. In the sky above, great birds hinder your progress by dropping, well, bricks in your path. The trail itself becomes quite tricky, as the way is broken by deep fissures. One misstep and you'll be goat feed by the time you hit bottom.



Finally you reach the top, just long enough for a breath of blue sky and a bit of Bach before the head billygoat butts you right back down to where you started. This time the going will be even tougher.

Canyon Climber achieves a cartoon-like atmosphere in the rendering of its various screens, to very pleasing effect. Your figure has blond hair, and wears a blue shirt with jeans. It actually seems to throw a shadow on the canyon wall, as well. The animation is smooth and the colors superlative.

You will spend a while with *Canyon Climber*. It took me a couple of days just to reach the top on a regular basis. Now I have begun to work on my score.

Send Up the Clowns

Several epochs ago, when I was a lowly undergraduate, arcade games were just beginning to use video screens. I remember an early one called Circus, and that it sat between Tank and Pong in the student union. Ah, those were the days.

"Oh, no," was my first thought when I loaded *Clowns and Balloons*, also from Datasoft. An exhumation of Circus: where is author Frank Cohen's respect for the moribund?

This report was exaggerated; I was dead wrong. This may very well be the most addictive game I have seen since *Threshold*.

In *Clowns and Balloons*, you manipulate a trampoline, shooting your player ever higher, as you try to break as many balloons as you can in your trajectory across the screen. The concept is simple, but play is not. You must anticipate where to move that trampoline at all times. Otherwise, in the flick of an eye, your player will land in a headfirst heap on the floor.

creative computing

SOFTWARE PROFILE

Name: Clowns and Balloons

Type: Arcade game

System: Atari 400/800 16K

Format: Cassette/disk

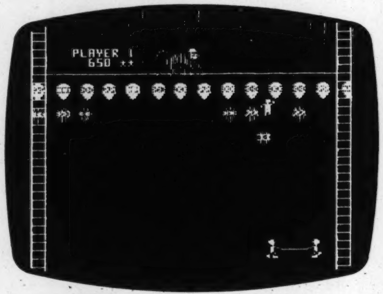
Language: Machine

Summary: Balloonatic adventure

Price: $29.95

Manufacturer:
Datasoft Inc.
19529 Business Center Dr.
Northridge, CA 91324

Stone Age devotees of the black and white coin-op Circus will especially appreciate the sophistication of *Clowns and Balloons*. The trampoline is carried by two silver-haired clowns, whose outsized shoes scamper wildly as they run from side to side. The balloons spin and shimmer as they glide across the screen, and they do so in vibrant colors.



The music, as in *Canyon Climber*, is superb. Even after I landed on my head, I found myself humming along with it. Again, all factors work together to form an "atmosphere" about the game. It is as if it were a cartoon rather than a computer representation. It works very nicely.

It was easy enough for me to predict that my bevy of kid playsters would go nuts for *Clowns and Balloons*. They liked it nearly as much as I do. Fortunately, they belong to someone else, so I can play to my heart's content after they have gone home to eat dinner. Three levels of difficulty keep the action at a "breakneck" pace. ☐

COMSTAR'S WRITTEN GUARANTEE—
AIR*SHIPPING WITHIN 48 HOURS

*EXCEPT SOME HARDWARE

ATARI

32K RAM	$ 85
48K RAM	189
NEWPORT PROSTICK	$ 31
VOICE BOX	139

	LIST	NOW
JOYSTICKS (PAIR)	$ 21.95	$ 19
PREPPIE (D,T)16K	29.95	23
CENTIPEDE (C)	44.95	33
MIDNIGHT MAGIC (D)	34.95	26
TRACK ATTACK (D)48K	29.95	23
STAR BLAZER (D)	31.95	25
BASIC COMPILER (D)	99.95	75
CANYON CLIMBER (T)16K	24.95	20
SHOOTING ARCADE (D,T)16K	29.95	23
CLOWNS & BALLOONS (D,T)	29.95	23
FROGGER (D,T)16K	34.95	26
GORF (D)16K	39.95	29
WIZARD OF WOR (D)16K	39.95	29
BATTLE OF SHILOH (D,T)48K	39.95	29
TIGERS IN THE SNOW(D,T)48K	39.95	29
NAUTILUS (D,T)32K	29.95	23
SLIME (D,T)16K	29.95	23
EASTERN FRONT (D,T)16K	29.95	23
REAR GUARD (T)16K	19.95	17
WAR (D)	24.95	20

	LIST	NOW
MICROSOFT BASIC (D)32K	$ 89.95	$ 67
BASIC A+ (D)32K	80.00	62
MACRO ASSEMBLER (D)32K	89.95	67
ASSEMBLER EDITOR (C)	59.95	46
PILOT (C)	79.95	59
LETTER PERFECT (D)24K	149.95	112
TEMPLE OF APSHAI (D,T)32K	39.95	29
CRUSH, CRUMBLE & CHOMP (D,T)32K	29.95	23
CRYPTS OF TERROR (T)16K	29.95	23
INTRUDER (T)16K	29.95	23
ACTION QUEST (D,T)16K	29.95	23
CROSSFIRE (D,T)16K	29.95	23
ALI BABA (D)32K	32.95	25
RASTER BLASTER (D)32K	29.95	23
CAVERNS OF MARS (D)16K	39.95	29
PAC MAN (C)	44.95	33
PROTECTOR (D,T)32K	29.95	23
CHICKEN (D,T)16K	29.95	23
VALFORTH (D)16K	39.95	33

(C) = CARTRIDGE (D) = DISK (T) = CASSETTE

apple®

	LIST	NOW
DAVID'S MIDNIGHT MAGIC	$ 34.95	$ 26
STAR BLAZER	31.95	25
LABYRINTH	29.95	23
DUELING DIGITS	29.95	23
CHOPLIFTER	34.95	26
BUG ATTACK	29.95	23
MICROWAVE	34.95	26
SWASHBUCKLER	34.95	26
BASIC COMPILER (DATASOFT)	99.95	79
ROACH HOTEL	34.95	26
RENDEZVOUS	39.95	30
PEEPING TOM	34.95	26
HI RES FOOTBALL	39.95	30
CROSS FIRE	29.95	23
THRESHOLD	39.95	30
PEGASUS II	29.95	23
FROGGER	34.95	26
STAR BLASTER	29.95	23
CONGO	34.95	26
GOLDRUSH	34.95	26
TWERPS	29.95	23
CYCLOD	29.95	23
BATTLE OF SHILOH	39.95	30
TIGERS IN THE SNOW	39.95	30
VISICALC 3.3	250.00	199
PINBALL	29.95	23

TRS-80

	LIST	NOW
BASKETBALL (D) I,III	20.95	$ 18
LOST COLONY (D,T)I,III	29.95	24
FAMILY TREE (D,T)I,III	29.95	24
ADVENTURELAND (T)I,III	19.95	17
ELIMINATOR (T)I,III	19.95	17
TEMPLE OF APSHAI(D,T)I,III	39.95	31
RESCUE AT RIGEL(D,T)I,III	29.95	24
RICOCHET (D,T) I,III	19.95	17
CURSE OF RA (D) I,III	19.95	17
EMPIRE OF OVERMIND(T)I,III	30.00	24
GALACTIC TRILOGY (D)I,III	39.95	31
GALACTIC EMPIRE(T)I,III	14.95	13
GALACTIC TRADER(T) I,III	14.95	13
GALACTIC REVOLUTION(T)I,III	14.95	13
SCARFMAN (D) I,III	19.95	17
SARGON II (T)I,III	29.95	24
PENETRATIR (D,T)I,III	24.95	21
FORTRAN-80 (D) I	100.00	80
BASIC COMPILER (D) I	195.00	147
EDITOR/ASSEMBLER+ (D) I	49.95	39
EDITOR/ASSEMBLER+ (T) I	29.95	24
LEVEL III BASIC (T) I	49.95	39
BATTLE OF SHILOH (T)I,III	39.95	31
TIGERS IN THE SNOW(T) I,III	39.95	31
FLIGHT SIMULATOR(T) I,III	25.00	21
DANGER IN DRINDISTI(D)I,III	19.95	17

COMSTAR

P.O. BOX 1730
GOLETA, CA 93116
(805) 968-2497

TO ORDER: CALL TOLL FREE 800-558-8803
IN CALIF. (805) 968-2497 or send check, money order or credit card number and exp. date. Include $2 shipping for software (call for hardware). Add 3% for Visa or MC (except Calif.). Calif. add 6% tax. There is a $2.50 charge for COD. Please include type of computer.

CIRCLE 152 ON READER SERVICE CARD

SOFTWARE STREET

CALL OR WRITE FOR A FREE PRICE LIST.

2.50 min. shipping

SOFTWARE STREET
3392 Clipper Drive
Chino, CA 91710
(714) 591-3061

PAC-MAN	32.95
CENTIPEDE	32.95
CAVERNS OF MARS	29.00
STAR RAIDERS	32.95
ASTEROIDS	28.00
MICROSOFT BASIC	75.95
MACRO ASSEMBLER	76.50
ENTERTAINER	79.00
MICROTEK 32K BOARDS	99.00

BOOKKEEPER KIT	189.00
BOOKKEEPER	115.00
ATARI SPEED READING	59.00
MY FIRST ALPHABET	27.95
CANYON CLIMBERS	21.21 (C) 25.46 (D)
CRANSTON MANOR	24.95
DEADLINE	39.00
AXIOM 80 COLUMN IMPACT PRINTER	299.00

PACIFIC COAST HIGHWAY	21.21 (C) 25.46 (D)
ZORK I & II	33.96 ea.
MISSILE COMMAND	28.00
K-RAZY SHOOTOUT	34.95
K—STAR PATROL	34.95
K-RAZY KRITTERS	34.95
K-RAZY ANTIKS	34.95
THRESHOLD	29.95

400	269.00
800	639.00
810	429.00
BLANK DISKS (10)	24.95
AXIOM IMP4QAA180 COLUMN IMPACT	499.00

ATARI

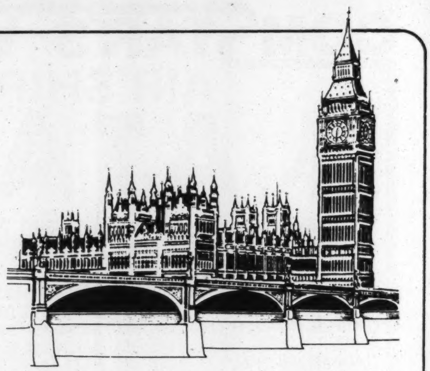
PRICES ARE SUBJECT TO CHANGE.
ABOVE ARE PREPAID PRICES.

MasterCard VISA

WE ALSO CARRY PERCOM SYSTEMS AND MUCH MORE!

ATARI IS A REGISTERED TRADEMARK.

CIRCLE 283 ON READER SERVICE CARD



side...the other side...the

Guy Kewney

If you can't impress the bankers with a launch plan, there is always the government. Or at least, there always used to be the government.

A lot of plausible people in the micro business are becoming very frustrated by the present British administration's reluctance to invest direct funds in worthy causes—in particular the Plausible Person's Get Rich Quick Fund.

Time was when raised eyebrows and a wagging finger could generate quite a tremor of fear, coupled with suggestions that Our Trade Position might be threatened if we didn't take steps to sponsor development work in one area or another. That time, it seems, is past.

Currently, the biggest failures as political scare images are the Japanese.

The government was persuaded last year that a year of celebration and festivities under the title Information Technology Year would be a great publicity idea: naturally everybody who put Margaret Thatcher up to this inevitably thought that a whole sequence of money-making and fund-gathering projects would follow. There was even talk of an IT Year Micro.

It is now mid IT Year, and word is that the IT Micro was doing very well on the normal rungs of the civil service ladder, until it got high enough that people in Downing Street (where the Prime Minister lives) could see where it was going. Chop! "Government no longer intervenes directly in industry, but leaves market forces free to operate," came the old, familiar phrase.

It was a grievous blow to Commodore, which happens to be the biggest micro producer here, but happens also to be regarded as an outsider.

The company has been working very hard on its British image, pointing out that none of the UK staff comes from America, and that much of its production is in Europe. And, added officials, we are prepared to be much more British, if only we could get a little recognition.

It got to the point of pantomine when Jack Tramiel arrived, gave interviews (fascinating, educational, thought-provoking as always) and spiced them with the quaint notion that Commodore's failure to sell as well in America as it had in Britain, was deliberate.

"I'm very glad," said Jack with a straight face, "that we had the restraint(!) to stay out of the games market, and concentrate on developing business applications in Europe."

He then vanished across the Atlantic with his trusted British assistant, Kit Spencer, who it is rumored, had "borrowed" one of Clive Sinclair's new pre-production ZX Spectrum models for the night. There was subsequently an almighty fuss, and the machine is said to have returned mysteriously the next week, with all its colors back to front—almost as if somebody had been analyzing the circuitry and hadn't been able to put it back together properly...but that, of course, is another story.

Commodore's suggestion that it might consider setting up a factory in Britain if it were given the contract to design the IT Year Micro, however, vanished into the black hole down which most requests for government sponsored contracts vanish.

Meanwhile, plausible people were still selling the idea of the Japanese threat, and the Fifth Generation, which they somehow manage to call the Veeth Generation.

Expert Systems became the buzzword of the age. "We know very little about what the Japanese are planning," was the message, "apart from the fact that they plan to take over the information technology world, and all the jobs that go with it."

And, it was pointed out, we also knew that Japanese information technologists were doing much of their development work around a language called Prolog, which is used to write expert systems.

Expert systems are not meant to be thought of as just databases full of detailed information on how to recognize the sort of plants that grow where oil may be found, or how to detect advanced renal cancer in a patient who has other kidney symptoms, but instead are the key to designing really understandable software.

The idea is that computers are programmed in logic rather than in detail. And, when the user enquires "How did it do that," it should be able to answer in terms of the application, rather than the screen and memory manipulations it has to perform.

Instantly, Micro Prolog was launched for CP/M machines, Micro Expert was reduced in price, and Lisp compilers began to be written for all sorts of esoteric machines, including the now famous British Broadcasting micro.

The Prolog interpreter is by far the most interesting of them all, despite the rather modest claims made for it by its producer, Logic Programming Associates.

To quote the publicity blurb that came with the launch, "The net effect of forty years of development of programming languages seems to be that there are very few programmers, and that very few of these programmers have any solid confidence that their programs are correct. Programming is still a craft activity."

The company compares this "craft" activity with most other modern production and design activities, (typically highly automated) which use sophisticated (computer based) aids for designing and manufacturing products.

Why not in programming, they ask. "One way of tackling the programming problem is to provide a programming language which is descriptive rather than prescriptive; and in which programs are descriptions of the input/output relation to be satisfied."

In other words, the program is a definition of what the program is supposed to compute, rather than a prescription of how it should be computed.

Current uses of Prolog are as a language for artificial intelligence research, an area of deep fascination, but still relatively little productive development—unless Prolog turns out to be the breakthrough.

As LPS points out, Prolog is not particularly suited for applications which require a great deal of routine numerical work, nor for a fair amount of real-time and commercial data processing work. "However, in these fields, logic is still a suitable specification language," they observe, "and Prolog can be used to speedily implement and test a prototype program."

For those who understand Prolog parameters, this version of the language is capable of 240 "resolutions per second" on a Z80 micro at 4 MHz, and the interpreter occupies 15K of memory. A system of at least 32K is needed to run it.

Compared with standard Prolog, Micro-Prolog is bigger, not smaller. It has significant extensions including an interactive editor, to which micro users have become accustomed with Basic editors, plus modules, and random access files.

Apart from that and similar interesting developments, however, there is no sign of much money coming forth from official coffers. The best that can be done, it seems, is to put up another £9 million sterling to supply computers to primary schools (children up to 10 or 11) having already seen a successful program to put micros (at least one per school) into secondary education.

The program, run by the Department of Industry with the Department of Education, has an awful long way to go before even a majority of children in these schools get to dirty the keyboards with their fingers, let alone do serious work. But it is designed to "prime the pump" rather than solve the problem.

The really irritating thing, from Commodore's point of view, however, is the fact that once again, its products have not been approved. Primary schools are to be given a choice between the two traditional school micros, the Acorn-built BBC micro, and one built by educational specialists Research Machines.

There is also a new machine on the list. It is the Sinclair ZX Spectrum.

If all this effort to hold up the spectre of the Japanese as a threat to our trade continues to fail, our respectable Great and Good Plausible People may be forced into their serious attacking posture, which is really needed only in desperation.

It hasn't quite come to that yet, but I rather think that in the next couple of months, we will start hearing the first suggestions that Expert systems, especially on micros, could have Serious Strategic Value.

Governments are known to be helpless in the face of such an onslaught. ☐

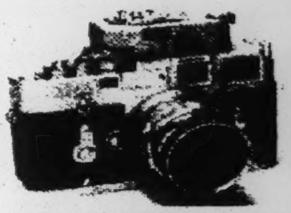
LET YOUR APPLE SEE THE WORLD!

The DS-65 Digisector® opens up a whole new world for your Apple II. Your computer can now be a part of the action, taking pictures to amuse your friends, watching your house while you're away, taking computer portraits . . . the applications abound! The DS-65 is a random access video digitizer. It converts a TV camera's output into digital information your computer can process. The DS-65 features:

- **High Resolution** — a 256 × 256 picture element scan
- **Precision** — 64 levels of grey scale
- **Versatility** — Accepts either NTSC or industrial video input
- **Economy** — A professional tool priced for the hobbyist

The DS-65 is an intelligent peripheral card with on-board software in 2708 EPROM. Check these software features:

- Full screen scans directly to Apple Hi-Res screen
- Easy random access digitizing by Basic programs
- Line-scan digitizing for reading charts or tracking objects
- Utility functions for clearing and copying the Hi-Res screen



HI-RES PICTURE USING THE DS-65 AND PICTURE SCANNER SOFTWARE

Use the DS-65 for precision security systems; computer portraiture; robotics; fast to slow scan conversion; moving target indicators; reading UPC codes, musical scores and paper tape and more! **GIVE YOUR APPLE THE GIFT OF SIGHT!** DS-65 Price: $349.95 / FSII Camera Price: $299.00 / Combination Price: $599.00

ADDITIONAL SOFTWARE FOR THE DS-65

—**Picture Scanner:** Provides a variety of different dithering algorithms for compressing the digitized image into the Hi-Res screen. Available on 13-sector disk. Price: $39.95

—**Superscan:** Enables you to enhance the DS-65's Hi-Res pictures with colors! Choose from 21 different colors and assign them to grey scale values, modify pictures, zoom, enhance contrast, etc. Print routines for the Anadex and Paper Tiger* are provided. Comes on a 13-sector disk. Written for The Micro Works by Magna Soft. Price: $79.95

—**Portrait System Software:** This program includes captions and a credit line, reverse printing for T-shirt application and the option to save portraits on disk. Specifically for use with a Malibu 165 printer. Call or write for more information.

*Paper Tiger is a trademark of Integral Data Systems, Inc.

MasterCharge/Visa Accepted

THE MICRO WORKS P.O. BOX 1110 DEL MAR, CA 92014 714-942-2400

CIRCLE 224 ON READER SERVICE CARD

images...ibm images...ibm im

Will Fastie

My father hates computers.

Well, that's what he says when asked, although he just told me he is getting (maybe) an IBM Personal Computer to use for word processing. I guess he could use it and still hate it.

Has my father ever told you that he hates computers? He'll make a point of it if you go over to him and compliment him on his writing for this magazine! AHA! The plot thickens.

My dad is a famous (well, in the right circles) physicist. His name is *Bill* Fastie. Lots of people know him, and think it's just wonderful he writes this column. Dad tells me that he carefully explains the true circumstances, but then I got a letter from a reader who says she called me to ask a question, got Dad by mistake, talked with him, was charmed, and fell in love with him, and then promptly forgot to call me. Charmed? Dad? Egad.

Now I have this dream about my father: he goes to a bar, announces to no one in particular that he hates computers, and is immediately mobbed by women. Meanwhile, in another part of town, I sit hunched over my PC, cranking out another column for him to get credit for.

I hate physics.

Languages

This issue of *Creative* gives me a long-awaited opportunity to tell you about the programming languages available for the IBM Personal Computer. There are quite a few, and the number is growing rapidly, considering that languages are usually of interest only to software developers and others with special programming requirements. Nonetheless, I think my comments here have a broader appeal, and may answer some of the questions you users might have about software development and programming.

I can't afford the space to give you a detailed analysis of each programming language. Also, although I hate to admit it and destroy any thoughts you might have about my omniscience, I don't know enough about all of these languages to do so. What I have done is borrowed heavily on the superb work of Jim Gilbreath and his article in the September 1981 issue of *Byte* entitled "A High-Level Language Benchmark." In this article, Mr. Gilbreath examined ten languages on scores of computer system environments and collected the results into what has become a "benchmark" study. In fact, several of the language compilers which I will mention are delivered with a copy of Mr. Gilbreath's benchmark program.

The program (I should say *"algorithm"*) is called The Sieve of Eratosthenes. It is a technique for finding all the prime numbers up to some maximum value, in this case 16,380. The algorithm is nice because it does not require the use of multiplication and division, and the resultant programs are less different and thus better compared. For details on the algorithm, and for purposes of comparison, see Mr. Gilbreath's article.

Table 1 summarizes the results I obtained from each language system tested. I chose the values shown in the columns because they give clues about each compiler, as I will now explain.

The compilation time is a measure of how fast a compiler runs. Although most software developers are more concerned about how fast the *compiled* program runs, the speed of compilation gives an indication of the efficiency of the compiler, and thus how well *it* might be written. As you can see, the times are very close. The Basic compiler scores very well here, probably because it does not have to do as much work as the other compilers.

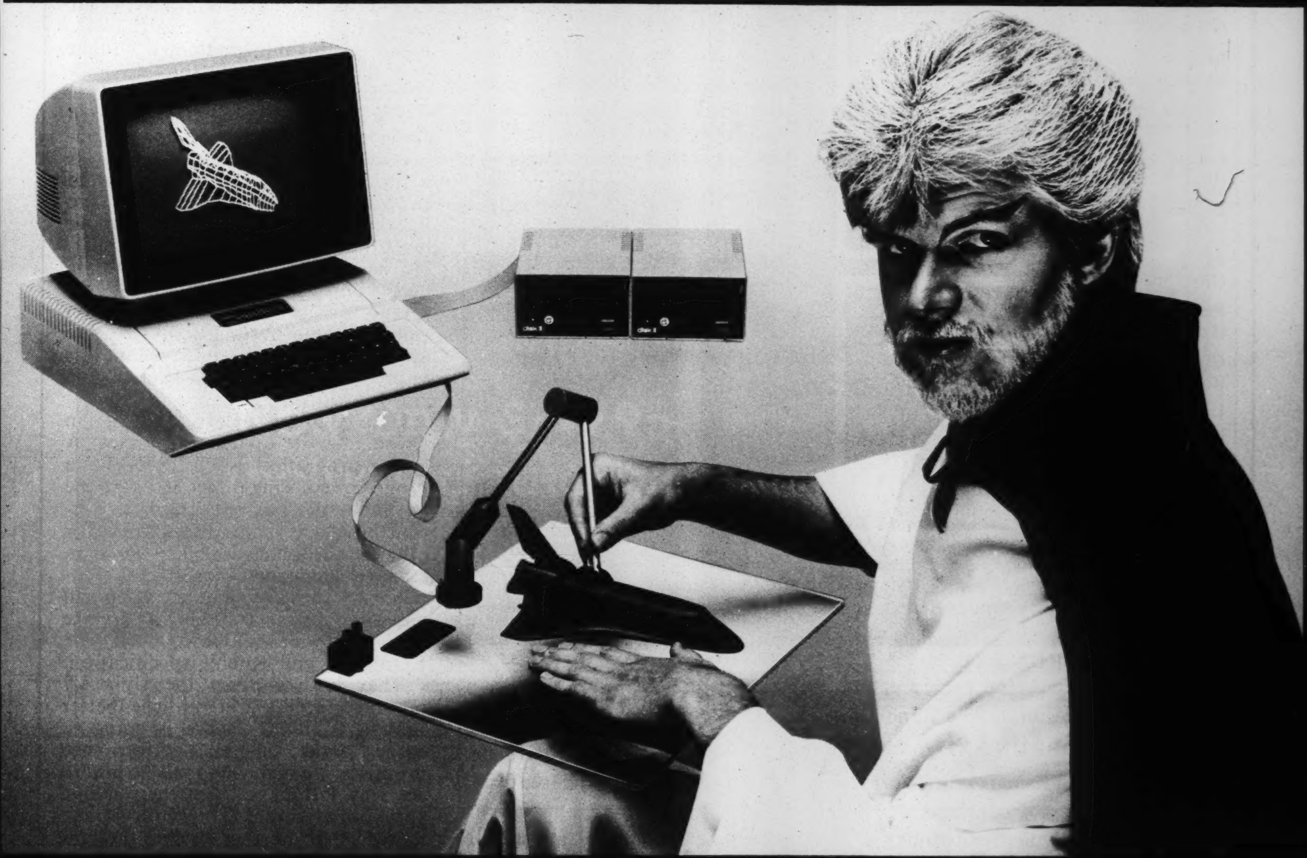
Object file size is an indication of how efficiently the compiler generates its output. This is a looser measure because different compilers produce different types of output. Among compilers of the same type, however, the object file size is interesting. The two C compilers listed have vastly different sizes, by a factor of 17, and the reason escapes me. Since the IBM PC diskette drives are relatively small (especially mine), I'd lean toward the compiler producing the smallest files, all other things being equal.

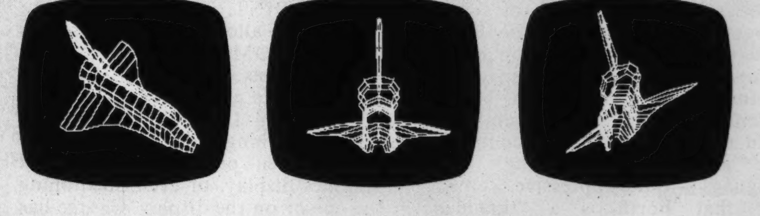
Executable file size is an absolute measure, and diskette sizes are only one reason. The invocation of a program which is smaller is also faster because less program has to be transferred from disk to memory. I lean very strongly to languages producing smaller executable files. The IBM Basic Compiler seems best at this, although a second executable file called BASRUN.EXE must also be loaded. The disk storage is optimal

---

W. H. Fastie, 7110 Sheffield Road, Baltimore, MD 21212. Correspondence can only be acknowledged when a stamped, self-addressed envelope has been provided. Source address: TCP394

Welcome to the third dimension





	Apple II*	IBM Personal Computer**
3 Axis Space Tablet (software included)	$475.00	–
4 Axis Space Tablet (software included)	$595.00	$595.00

VISA, MasterCard and C.O.D.'s accepted.
CT residents add 7.5% Sales Tax.

***Minimal Configuration: 48K, Applesoft, DOS 3.3**
****Minimal Configuration: 64K, Game paddle adapter, color/graphics adapter**

Apple and Apple II are Trademarks of Apple Computer, Inc.

in computer-aided graphic design.

Introducing The Space Tablet™ from Micro Control Systems. The first three-dimensional spatial digitizer compatible with Apple II™ and IBM Personal Computers.

The Space Tablet lets you interactively record x, y and z coordinates of any object – even one that doesn't really exist – then allows you to manipulate any or all of those coordinates with the push of a button. A fast, practical way to play "what if?" in any design situation.

What's more, specially written software allows you to rotate and rescale drawings instantly – or even compose one drawing from several components. All at a fraction of the price you'd expect to pay.

Applications for The Space Tablet are truly unlimited. Design. Engineering. Architecture. Science. CAD/CAM. Graph reading. And so much more. It can even be used as a two-dimensional digitizer.

Let us help you enter the third dimension in graphic design. Call or write and we'll tell you how The Space Tablet can work for you.

Micro Control Systems,
230 Hartford Turnpike, Vernon, CT
06066, (203) 872-0602.

MCS

CIRCLE 210 ON READER SERVICE CARD

Table 1. Sieve of Eratosthenes Benchmark Results.

Compiler and (Vendor)	Compilation Time	Object File Size	Executable File Size	Execution Time
Basic Interpreter (IBM/Microsoft)	—	—	—	2430 (1)
Compiled Basic (2) (IBM/Microsoft)	1.7	1267	1536	300 (1)
Compiled Basic (3) (IBM/Microsoft)	1.8	1709	19072	220 (1)
Fortran (IBM/Microsoft)	13.9	2079	68736	777 (1)
Pascal (IBM/Microsoft)	12.0	1015	32640	76
PC/Forth (Laboratory Microsystems)	—	—	—	56.4
C86 (Computer Innovations)	7.6	512	9472	22
Lattice C (Lifeboat Associates)	7.0	8777	19072	11
Cobol (IBM/Microsoft)	12.1	3411	7424 (4)	416 (5)

(Times in seconds; sizes in bytes.)

Notes:

(1) Actual program performed one iteration and the resulting time was obtained by multiplying by ten.

(2) This time was obtained from the compiler option requiring use of the runtime module BASRUN.EXE.

(3) This time was obtained from the compiler option forcing a full search of the library and resulting in a stand-alone executable program.

(4) Requires COBRUN.EXE runtime module to execute.

(5) Cobol entry is included for information only. Run time is not valid (see text).

nevertheless and the load time is average. IBM Fortran appears the worst, producing an enormous executable file for a program of only 25 lines.

Execution time is the most interesting value to just about everyone. Ultimate efficiency of the program is pleasing to the developer and impresses the buyer. For some applications, it is just plain critical.

One item in the table is included for information only, as the results are not valid in comparison to the rest. IBM/Microsoft Cobol has a limitation which prevents the algorithm from being coded directly. Instead of spending the time to rework the program to allow it to match the algorithm (which would have resulted in 1899 primes in the first 16,380 numbers), I ran it to its limit (302 primes in the first 2000 numbers). Since it took 416 seconds, I wasn't worried about misrepresenting the Cobol compiler.

For me, there were two real surprises. The first was the Basic Compiler, which improved the performance of the program by one order of magnitude (a factor of 10). That result is quite satisfactory, and I have experimented with several programs, many of which have benefitted significantly. I can think of several programs for the PC which could also benefit from the application of the compiler. The second surprise was the performance of PC/Forth. At 56 seconds it placed third overall, behind two high-powered C compilers, and ahead of every single IBM language — quite impressive. Remember that Forth is a "threaded" language system, which is similar to an interpretive system without the overhead.

The two C compilers did pretty well against this competition, but not as well as I had hoped. Mr. Gilbreath chose the fastest Z80-based execution as his standard, which turned out to be Digital Research's PL/1-80 running in 14 seconds. He called this performance "1." The C86 program ran in 22 seconds, or 1.57, while 11 seconds for Lattice C rated a 0.79. Mr. Gilbreath reports a four-second execution time for assembly language on a 5MHz 8088, rating 0.28, which represents a better rating than the IBM PC's 4.77MHz 8088 can achieve. C on a PDP-11/40 produced a program that ran in 6.10 seconds, and rated 0.43. Based on this information, I thought that the C compilers should break 10 seconds.

The Lattice C compiler came darn close, and certainly recorded an impressive time. The C86 compiler was a little disappointing, but I should explain that I twisted George Eberhardt's arm to let me talk about his (Computer Innovations') compiler. He had asked me to wait until he had his next revision ready, the revision in which code generation would be improved. I appreciate the opportunity to talk about it, and his improved version should be available as you read this.

C is a pretty handy language in which to write systems programs. A system program is usually defined as a program requiring direct access to the machine environment, the best possible efficiency, special techniques, or other features unavailable in the highest level languages. Both the C compilers I tested are complete (C86 still has a few features missing as I write this) and compatible with the Kernighan and Ritchie specification.

They both support the Unix V7 interface. I like C86 a little better though. I think George is going to make good on his performance promises — you have to talk to him to see why I think so. But there is one very special feature of his library which indicates to me that he has thought things out carefully.

The C86 library has a routine called SYSINT. The purpose of the routine is to allow C to directly access DOS and ROM BIOS functions in the IBM PC. This is especially important because there are no functions available through IBM DOS that allow access to things like video display initialization, plotting points on a graphics display, or even positioning the cursor on the display. George has provided the "hook" that systems programmers need to get those functions. I like it, and I think it speaks well for his attitude. By the way, a programmer can certainly write the same function to support the Lattice C compiler, but it is not as easy as it might seem at first.

So I like the results from the C compilers, PC/Forth, and the Basic Compiler. IBM Pascal was acceptable at 76 seconds, although the executable file was somewhat large. On the bad side, the Fortran program ran very slowly. I have always thought about Fortran as having very good performance, but this version leaves some-

Apple® II's best LISP just got better!

LISP (for List Processor) was developed at MIT in the late 1950's. As one of the oldest languages still in active use, LISP's applications include artificial intelligence, natural language processing, robotics and educational and psychological programming. LISP's unique features give the programmer the power to develop software that goes far beyond the limitations of BASIC or PASCAL.

In use at hundreds of colleges and by many hobbyists around the world, P-LISP has been acclaimed by experts in the field as the best implementation written for the Apple II®.

Now you can get the newly released Version 3.1 at a reduced price. The P-LISP Package includes: P-LISP 3.1, a complete 52-page reference manual, and the specially written P-LISP Tutorial.

Now Only $149.95 including tutorial

Compare P-LISP to Datasoft's APP-L-ISP

Only P-LISP has:

- Floating Point Math
- HiRes Graphics
- Property Lists
- Function Trace
- ONERR Error Trapping
- User Defineable Memory Allocation

P-LISP:

- 83 Functions
- 15K ELIZA Program
- P-LISP Tutorial

APP-L-ISP:

- 63 Functions
- 3K "Doctor" Program
- Winston & Horn Book

Orders Toll-Free 800-523-0725; In Pa.: 215-387-1500
4005 Chestnut Street, Phila., Pa. 19104
Dealer Inquiries Invited

gnosis

Apple is a registered trademark of
Apple Computer, Inc
APP-L-ISP is Copyright 1981
by Special Software Systems
Applesoft in ROM required
for Floating Point Math and HiRes Graphics

CIRCLE 179 ON READER SERVICE CARD

unicomm INC. T.M.

THE PURCHASING SERVICE FOR HOME & BUSINESS COMPUTERS
18639½ VENTURA BLVD., TARZANA, CA 91356 (213) 996-5722

your ATARI® connection

ATARI 800	659.00
NEC 823A	479.00
OKIDATA 82A	459.00
NEC color monitor	329.00
HAYES Smartmodem	219.00
HAYES Micromodem II	269.00
VERBATIM diskettes	26.00

add 3% shipping/handling/insurance
30 day guarantee
FREE catalog and newsletter

CIRCLE 305 ON READER SERVICE CARD

DISCOUNT TRS-80®

TRS-80 MODEL III

$1950	$819
48-K 26-1066	16-K 26-1062

TRS-80 MODEL II 64-K 26-4002 **$3000**

TRS-80 MODEL 16 128-K 26-6002 **$4825**

TRS-80 8.4 MEGABYTE HARD DISKS (PRIMARY UNIT) . . . $4000.

TRS-80 COLOR

$309	$425	$525
16-K 26-3004	16-K 26-3002	32-K 26-3003

WE HAVE COLOR DISK DRIVES 0 — $475 1-2-3 — $315

WE ALSO CARRY EPSON AND OKIDATA PRINTERS, XEROX 820 AND ALTOS COMPUTERS.
NO OUT-OF-STATE TAXES. T.M. TANDY CORP.

Sold with the manufacturer's limited warranty. Copies of such warranty may be obtained for review from Perry Oil and Gas Co.

PERRY OIL & GAS INC.
Dept No H-8 137NORTH MAIN ST., PERRY, MICHIGAN 48872
PHONE (517) 625-4161 MICH

WE ACCEPT CERTIFIED CHECKS, CASHIERS CHECKS AND MONEY ORDERS.

FOR OUR PRICES, PLEASE CALL TOLL FREE
1-800-248-3823

CIRCLE 246 ON READER SERVICE CARD

thing to be desired. My friend Tom tried a quick experiment with Fortran. He wrote a program to display the first 25 numbers, their squares, and their square roots. I wrote the same program in interpretive Basic, and it ran twice as fast. No kidding.

Add to this the fact that Fortran has a relatively low numeric precision, and you have little reason to choose the language. In fact, those users with Fortran programs already should be warned about this version of Fortran for reasons of both performance and precision.

One more thing. I expected the Gilbreath programs to work as published, except for Cobol. In each case his programs are simple and use no non-standard features. This proved to be the case for C, Basic, and Forth. The Fortran and Pascal compilers both objected to the Gilbreath version, and I had to make some rather subtle changes to get a clean compilation.

Actually, the Pascal compiler didn't let me off the hook: the program still generates three warnings, and I learned only today what I had done wrong.

It is nice to know that the IBM PC is so well supported with programming languages, both by IBM and other vendors. There are languages from other sources than those I have mentioned, and they are listed at the end of the column.

Screen Editors

If you do a substantial amount of programming in a language other than Basic, you will have occasion to use an editor of some kind. Editor programs are similar to word processors, except that they do not allow control information in the text, they do not manage the ends of lines for you, and they do not usually know how to print "fancy."

They usually have several features specially designed for use by programmers and not needed by writers or typists; the most common is a *macro* facility which allows complex sequences of commands to be executed at the same time, or many times.

IBM DOS comes with an editor called EDLIN. With the exception of the creation of the tiniest files EDLIN is useless. No professional programmer will tolerate this editor for long. If nothing else, EDLIN is an inducement to buy a quality text editor.

Another possibility is the use of a word processor as a program editor. Many word processors support the capability if the user is careful. For example, as long as you force a NEWLINE at the end of every text line and prevent the word processor from "wrapping" to the next line, the text will be organized properly. You may have to avoid using tabs if the word processor embeds a tab character. And there are other things to avoid. The combination of these features that cannot be used makes word processors a questionable choice.

There are several editors, usually called *full-screen* editors, that are designed for program text editing. I have had a chance to try a few in the course of preparing the programs for the language tests, and here are my impressions.

Two particularly powerful programs are *VEdit* from CompuView and *PMate* from Lifeboat. These programs have many similarities and are really loaded with commands and thus, I assume, features. I tried both of these programs, and stopped using them quickly. The reason: I was unable to learn how to use them in less than 15 minutes.

Ted Nelson (and my friend Rich) has often said that a program is no good if it can't be used after ten minutes of trying. That is not exactly my position in this case, but it does apply. Remember that I am an experienced programmer (did you know that?), and I have used a slew of editors in my time. I know what an editor is supposed to do, and I think I should not have to spend half a lifetime trying to figure out the next one.

PMate and *VEdit* failed this test. They are powerful, but at the expense of considerable complexity. *VEdit* is simpler, with a one-page command

EasyWriter Revisited

I am certainly one of the harshest critics of the original version of *EasyWriter* offered by IBM. My criticism is unlikely to wane because I think IBM was foolish to have taken on such a poor product. Now IBM has announced *EasyWriter 1.1*, and it's time to take another look.

This column was prepared with *EasyWriter 1.1*, and I can say with some authority that the problems of Version 1.0 have been solved. My harshest complaints and the current situation are described below.

Reliability: The new version has never failed in any way. I do not have the lack of confidence that was so necessary when using Version 1.0.

Performance: Nothing less than a miracle. *Everything* in Version 1.0 was slow. Version 1.1 still has some slowness in certain functions, but the critical things like NEWLINE and insertion work much faster. It is no longer possible to out-type the program. Deletions are faster, although character-by-character deletion speed could be improved.

File System: All *EasyWriter* files are now DOS files. A conversion utility is provided to convert old *EasyWriter* Version 1.0 files into DOS files, and to convert text files, such as those produced by *VisiCalc*, into files *EasyWriter* can read. The conversion process from 1.0 to 1.1 is more tedious than it has to be, but it does work properly and it only has to be done once.

Printer: Version 1.1 handles the printer properly, as far as I can tell.

Human Factors: EasyWriter 1.1 works much more smoothly than its predecessor. The menus have been reworked and enhanced. Most functions work more naturally. Enough key sequences are different from Version 1.0 that it is not necessary to learn the program again.

Above all, the documentation is much better. A tutorial is included, and a greater level of detail is provided about *how* things work. Most things are explained better. I have only one complaint about the book I have (a final draft), something that might go away in the final version: the table of contents is spread throughout the manual, appearing in sections instead of in one place.

The best thing about *EasyWriter 1.1* is that owners of 1.0 can get a free upgrade. This is accomplished by taking the title page of the original manual to your dealer, who will order a new program for you. I'd say that's handling the problem pretty well.

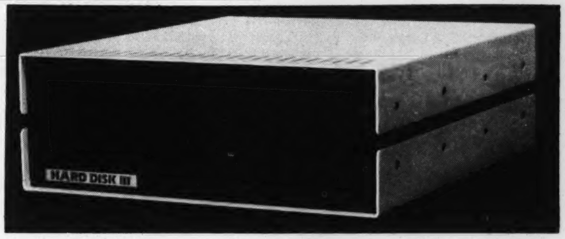
EasyWriter 1.1 compares favorably with similarly-priced *Volkswriter* as of this writing. Because *EasyWriter* is a single program module as opposed to *Volkswriter's* two, I think I even prefer it slightly.

WHAT'S ECC?

ECC (Error Correction Code) is a polynomial derivative which is used to detect and correct errors. In simpler terms, this means that the computer will detect and automatically correct data errors sometimes generated spuriously in the equipment.

VR Data's HARD DISK III has this feature. If your system will abend or die during a data error or if you must always have the correct data for your functions, ECC is a necessity. This feature has filtered down from the larger computer systems and is now used by manufacturers of superior micro computer products.

Imagine a 5 meg Winchester Hard Disk with the following features:



ALL FOR $1899. Complete

- ECC—onboard buffer
- FCC approval—Heavy Duty Power Supply
- Automatic power on with system
- Heavy duty linear power supply
- Gold plated contact on all connectors
- Heavy gauge aluminum chassis
- 115/230 VAC 60/50 HZ Standard
- State-of-the-art controller
- 2 pass forced air cooling system

ONLY FROM VR data

777 Henderson Boulevard N-6 Folcroft, PA 19032
(215) 461-5300 (800) 345-8102

Interfaces to: Radio Shack TRS 80 Model I • Radio Shack TRS 80 Model III • IBM Personal Computer • Others to be announced

CIRCLE 310 ON READER SERVICE CARD

Finally . . . a name disk for a no name price! Available direct to you from I/O Management Corporation.

DATAPRO™ is an outstanding flexible disk manufactured with a flakeproof oxide coating burnished to prevent drive head maintenance and insure data integrity. Each disk is critically tested Read/Write 100% error free of bit drop in/drop out and after 12 million passes still retains accurate original output. DATAPRO™ is unsurpassed for high durability and low abrassiveness. OH-equipped with reinforced hub rings, consistent with all industrial magnetic media. Make all your input/output computing professional. Go with the pros.

GO DATAPRO!™

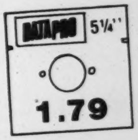
DATAPRO™

Flexible Disks

Division of I/O Management Corporation
463 Station Avenue, S. Yarmouth, MA 02664

IN MASS.: 1-800-322-0453
NATIONWIDE: 1-800-343-1292

Dealers welcome.



DATAPRO
8''
2.79

Introductory offer. Order toll-free.

In Mass.: 1-800-322-0453
Nationwide: 1-800-343-1292

☐Check (to Datapro™) ☐Money Order
☐M.C. ☐Visa Exp.__________
# __________
Computer __________ Hard Sector / Soft Sector
Name __________
Address __________
City________ State______ Zip______
Phone __________

	# of 5¼'' 10 pack	# of 8'' 10 pack	
Single Side/Single Density	17.90☐	27.90☐	______
Single Side/Double Density	21.90☐	29.99☐	______
Double Side/Double Density	34.90☐	39.99☐	______
Double Side/Double Density Flip Flop	29.90☐		______
Library case (holds 10)			2.50
Retail Software Pkg. (1)			1.25
UPS/Shp. & Handl.			2.00
5% Sales Tax (in Mass.)			______
Total			______

Please no C.O.D. or purchase orders.

CIRCLE 193 ON READER SERVICE CARD

A Harrowing Experience

You may remember that I complained about the lack of in-house service from IBM, and that I was unequivocal in my opinion (?) that IBM would not get my service dollar. Having one's system break is the best way to have one's feet brought down to earth, and that's exactly what happened to me.

One evening as I was writing, my Monochrome Display started to act up. The observed symptom was a loss of the display, followed shortly by its return. The first instance put my heart in my mouth, and I was dying when it happened the second time. Just as I began to worry seriously, the display dropped out for the third, and as it turned out, final time. Fortunately, I remembered what I was doing and I was able to exit the word processor without losing my work.

But what had happened? I took my copy of the IBM Advanced Diagnostics out and got to work. The rest of the system seemed okay. Following instructions for the display test, I got out my trusty VOM (volt-ohm meter) and took readings from the display adapter connector. They all matched, and at the end of the procedure were the words I was dreading: "Replace your display," along with directions to Section 3, "Removal/Replacement."

No problem, right? Just pop down to your local dealer and get it fixed? Well, er . . . that is, sure, if you happened to have purchased a service contract. Me? Uh, um, you know, it just slipped my mind. That's right, no service arrangements. So I began the process of calling both my IBM Product Center and my local Computerland store.

Without a contract, IBM politely directed me to the toll-free number and Greencastle, IN, home of IBM Personal Computer Maintenance. I tried calling them every ten minutes for six hours, and got a constant busy signal. (That many PC's broken, huh?)

In the meantime, I got through to Computerland. They seemed a little confused at first, but finally were able to give me pricing. The first deal was a trade-in for a new monitor, a simple replacement rather than repair, costing $320. Since the monitor only costs $345 to begin with, I quickly rejected that suggestion.

The second suggestion was time and materials repair at $42 per hour, which I thought was reasonable (IBM charges $96). However, Computerland indicated that they did not have the schematics or parts for the display, and suddenly T&M didn't sound too good anymore.

Although my calls to Greencastle never got through, I was able to piece together how that would work. First, I would ship the display to Greencastle. For a fixed fee, they would inspect the unit to determine the problem. They would then call me with a price for repair. If the repair cost exceeded some percentage of the original cost, Greencastle would replace my unit for that percentage.

I was rather depressed when I got home, and I decided to turn on the system to see if, by some miracle, the display would work. It did! And then it went away. In a fit of rage, I slapped the side of the display. It worked again! And then I knew what was wrong. With my trusty screwdrivers at my side I dismantled the display, plugged the two loose connectors tightly on the board, found out why they had been pulled loose and arranged everything so it wouldn't happen again, and closed it up.

Well, that put the fear of God into me, so I'm off to either IBM or Computerland for a service contract. I was really worried about having my PC available for writing this column, and I just can't risk it anymore. Time for insurance.

In the meantime, IBM maintenance pricing has changed quite a bit. Originally they priced each item independently. The new policy is considerably simpler and a little cheaper. The crux of the new deal is that everything contained in the system unit except memory boards and diskette drives is covered by single fee. The rest of the program is explained by the chart.

Item	Mail-in	Walk-in	Pick-up/ Delivery	%
System unit and keyboard, most devices	$130.00	$148.00	$185.00	7-12
64KB memory board	85.50	97.50	122.00	35
Each diskette drive	43.00	50.00	62.00	10-14
Monochrome display	46.50	53.00	66.50	19
IBM 80 CPS printer	125.00	143.00	179.00	32

Mail-in service means that the system must be shipped to Greencastle, IN. Walk-in means *you* carry the thing to IBM, and pick-up/delivery means IBM comes to you, and then returns it. The last column shows how much the service costs as a percentage of the purchase price of the component.

summary. The *PMate* command summary is almost *six* pages.

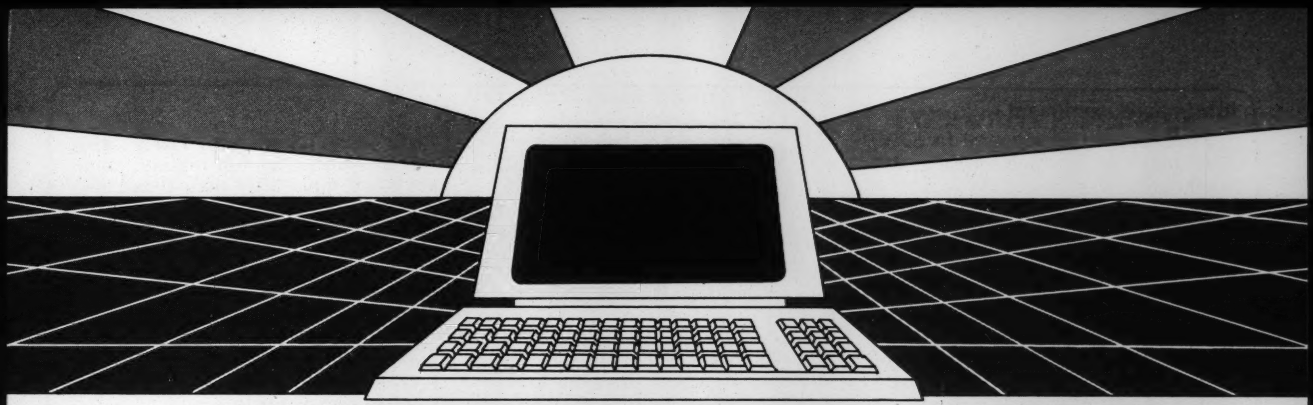
When *VEdit* is invoked, it clears the screen and leaves an * prompt in the upper left corner. That's it. From there, you better know what you are doing. *PMate* is a little better, because it provides some status indicators at the top of the screen and a line dividing the command area from the text area.

Unfortunately, the cursor appears to be in the text area, giving the impression that it is ready for text entry. It is really in command mode, just like *VEdit*. Both programs have very poor human factors. I know these programs are powerful, and I know they have a following, but I just don't like them.

A better-engineered editor is *Edix*, from Emerging Technology Consultants. This program is delivered with an on-line tutorial which is fantastic. It took about 15 minutes for me to get through, and I then knew how to work the program *without having had to crack the manual*. This tutorial is worth seeing for the experience, and I would even suggest a special trip to your store to see it.

That is the good part, though. I think the program itself is all sex and no substance. For example, *Edix* supports a split screen concept which allows up to four windows, each handling an independent file. That's overkill, because two independent screens are enough. The usual case for multiple screens is the desire to get a portion of one text file into the file really being edited.

In other words, you are working on file A, a new program. Your favorite subroutine is in file B, so you switch to the other screen, get hold of B, and find the piece of code. You then copy it into file A and continue the main edit. I just can't see why a third or fourth window would be helpful; they look very good in a demo, though.



DISCOVER THE MAGAZINE THAT HELPED LAUNCH THE MICROCOMPUTER INDUSTRY

Computers&Electronics

formerly Popular Electronics

An EPROM Programmer for Small Computers

Scope Switch Provides Multi-Channel Traces

FORREST MIMS COMPARES

The New Handheld Computers

Sharp Panasonic Radio Shack

Quasar Hewlett-Packard

Tested in this issue:
Shure V15 Type V Phono Cartridge
Sanyo 19" Color TV Receiver
Fox BMP 10/80 Scanner

Incredible as it may seem, *Popular Electronics* helped launch the microcomputer industry. Back in 1975, we published plans for building the first powerful microcomputer based on the 8080 cpu. These plans generated incredible excitement—and started the world thinking about personal computing.

Since then, we've added more coverage of personal computing. Today, so much of the magazine is devoted to microcomputers that we've changed our name to...

Computers & Electronics

Computers & Electronics continues the *Popular Electronics* tradition of helping our readers experience the advances of the future—today. We do it with clearly written, in-depth articles explaining each innovation...plans for building useful, money-saving projects incorporating the newest technology...reviews of the latest mass-produced equipment. Whether it's microcomputer equipment, audio, video, or personal electronics, *Computers & Electronics* will make it possible for you to enjoy the newest, the most sophisticated, the most innovative technology around.

Helpful buying guides

Computers & Electronics compares and contrasts computers and other electronics gear in meaningful buyer's guide articles. We discuss features and options, what to look for, and how to get the best value. Recent buyer's guides have covered computer printers, pocket computers, sophisticated telephones, video cassette recorders and high-tech audio cassettes.

World-famous test reports

In every issue of *Computers & Electronics* you'll find our famous in-depth test reports. We take a new product, test it and analyze the results. Recently we've tested the Radio Shack TRS-80 Model III, the IBM Personal Computer, and the Sinclair ZX-81. Microcomputers by Apple, Atari, Hewlett-Packard, Intelligent Systems and Netronics. Plus an interactive data terminal, software, and a variety of audio, video and testing equipment.

Innovative construction projects

If you're a do-it-yourselfer, you'll love the construction projects in *Computers & Electronics*. Not only did we bring the world the first successful microcomputer kit, but also projects for building the first low-cost modem. The first computer keyboard integrated with the computer (SOL). The first low-cost voice synthesizer. The first low-cost logic analyzer. The first 1802-based microcomputer (ELF). The first low-cost function generator. The first gas-laser communicator (awarded a place in the Smithsonian Institution). The first low-cost color graphics computer module. An interface to transfer narrow line listings from your TRS-80 Pocket Computer to either a printer or CRT screen....

As you can see, our construction projects, while not necessarily complex (thanks to multifunction IC chips), will keep you at the forefront of technological development—at remarkably low cost. And in the future, we'll be bringing you construction projects to help you make your microcomputer more useful—whether it's an enhancement, an application, or a merging of technology with external controls and products.

Get the leader in the field—at up to 33% off!

Computers & Electronics is the world's most widely read computer and personal electronics magazine. Now you can subscribe at big savings: up to 33% off. At our New Subscriber rates, a one-year subscription is only $12.97. Take advantage of this offer—complete and return the coupon or postage-paid reply card today!

Computers&Electronics P.O. Box 2774, Boulder, Colorado 80322

☐ **YES!** Send me one year (12 issues) of *Computers & Electronics* at $12.97—I save 19%.

☐ I prefer two years for $22.97—I save 28%.

☐ Make that three years for $31.97—I save 33%.

Savings based on full one-year subscription price of $15.97.

Mr./Mrs./Ms.______________________________
(please print full name)

Address____________________________Apt._____

City_______________State__________Zip__________

CHECK ONE: ☐ Payment enclosed. ☐ Bill me later.

Offer valid in U.S. and possessions only. Please allow 30 to 60 days for delivery of first issue.

8H336

IBM Images, continued...

I had trouble getting used to *Edix*. The bulk of the commands are invoked by depressing ALT and a letter key. My problem was remembering what ALT combination did what, not right after my tutorial, but a week later. I can't have that. I must be able to go away for a long time and then get working again without pain. *Edix* has a help key, which gets you a list of all the commands on the screen. That's good, but not if you have to look at it all the time.

Edix has a couple of good features. It is very, very fast. Getting from one end of the file to the other happens at once, regardless of the file length. It will also take advantage of extra memory, giving a greater maximum file size that can be handled. *Edix* does not provide a macro capability.

I know what you are thinking: Okay, Will, if you don't like those, what the heck *do* you like? I can't tell you. Okay, okay, call me a tease. I promised the vendor that I wouldn't talk until they let me. Their editor, however, is *terrific*. It is as powerful as all the rest, it is simple to use, and its human factors are very good. I hope to be able to tell you about it next month. The company is entering the small computer field for the first time and is being very careful and conservative. Good for them! Hang tight: I'll tell you the minute I can.

New Products

Arlington Software+Systems has announced *PCHMS, The Personal Computer Home Management System*. I will have a review of this product next month because it is the first software package I have seen for the PC that is directed at the consumer market. It provides an address and telephone directory, a home inventory, insurance records, a credit card file, medical records, and information files such as telephone area codes. Functions provided include a 20-year calendar, metric conversion, and a printing calculator. Price is $89.95.

Ensign Software has released several packages for the PC. Two of particular interest are a *Basic Cross Reference* program and *Games Package I*. Both are very well done. The cross reference program is notable in that it will accept either a text file *or* the regular .BAS file. It figures out which type it is. The games diskette is very nice. There are ten programs, including an excellent blackjack, a cribbage game (I play cribbage, and the program is good), Qubic, Othello, and a very nice Star Trek variant called Space Trek. These programs have one thing in common: they are very well written, and consistent in operation and behavior from one to the other. I was very impressed with the value of the games package at $29.95. Price of the *Cross Reference* program is $24.95.

Other products from Ensign include *ISAM Database* ($69.95), *Bowling League Statistics Manager* ($99.95), *HP7470 Plotter Demo* ($24.95), *Electronic Disk* ($69.95), bumper stickers (!?!?) with either "I OWN AN IBM" or "IBM-PCs EAT APPLES" for $2 each, and an ISAM Demo Diskette with documentation ($15.00). If *Games I* and *Cross Reference* are any indication, I have great confidence in these other products.

Practical Peripherals, Inc., has a product for the Epson printer called Microbuffer. This is a board that is added inside Epsons and provides 16K bytes of buffering. This allows rather large files to be printed without having the computer wait. I got one of these cards and put it inside my IBM 80 CPS version of the Epson, and is it terrific! I tell *EasyWriter* to print a few pages, the printer starts, and *EasyWriter* says OK, now what? I love it. The only disadvantage is that once you get that memory loaded, the printer runs until the buffer is empty. The only way to stop it is to turn the printer off. The 16K Microbuffer is $159.

I have mentioned the NEC 3550 Spinwriter before. It is the one with the parallel interface that plugs into the same printer adapter used to drive the IBM Printer. What's new is that IBM Product Centers will now be carrying the device. I am really surprised. This is the most expensive non-IBM product to be carried by IBM, and goes contrary to my guess that IBM would provide their own letter-quality printer.

I don't have an official price from IBM, but it appears to be standard list. Note: the fact that IBM sells this printer means that they will have to support it in software. That makes it almost a *de facto* standard in my book. IBM has warned me, however, not to read too much into this.

Two new graphics screen printing utility programs are available. They are *Frieze* from Starside Engineering ($55) and *Screen Print Program* from M.A.P. Systems, Inc. ($44.95). I have not had a chance to try either program. The M.A.P. Systems product claims some good features, including screen dumps from either display type, printing of the extended IBM character set, and invocation from the PrtSc key. Starside's *Frieze* also works from PrtSc, but requires some keyboard input after that. It can also dump a file from disk.

Next month: as many games as I can find! □

Firms mentioned in this column:

Starside Engineering
P.O. Box 18306
Rochester, NY 14618
(716) 461-1027

M.A.P. Systems Inc.
1120 NASA Road One, Suite 444
Houston, TX 77058
(713) 333-9640

Practical Peripherals, Inc.
31245 La Baya Dr.
Westlake Village, CA 91362
(213) 991-8200

Lifeboat Associates
1651 Third Ave.
New York, NY 10028
(212) 860-0300

Compuview Products, Inc.
1955 Pauline, Suite 200
Ann Arbor, MI 48103
(313) 996-1299

Ensign Software
2312 N. Cole Rd., Suite E
Boise, ID 83704
(208) 378-8086

IBM Corporation
Systems Products Division
Entry Systems
P.O. Box 1328
Boca Raton, FL 33432

Arlington Software+Systems
97 Bartlett Ave.
Arlington, MA 02174
(617) 641-0290

Microsoft Corporation
10700 Northup Way
Bellevue, WA 98004
(206) 828-8080

Laboratory Microsystems
4147 Beethoven St.
Los Angeles, CA 90066
(213) 306-7412

Computer Innovations, Inc.
75 Pine St.
Lincroft, NJ 07738
(201) 530-0995

Other Language System Suppliers:

Miller Microcomputer Services
61 Lake Shore Rd.
Natick, MA 01760
(617) 653-6136
Forth

SuperSoft
P.O. Box 1628
Champaign, IL 61820
(217) 359-2112
Ada, C, Lisp, Basic, Fortran IV and Ratfor, Forth; these are standard products from SuperSoft that are not necessarily ready for the IBM PC.

Ryan-McFarland Corporation
9057 Soquel Dr.
Aptos, CA 95003
(408) 662-2522
RM/Cobol

Micro Focus
1601 Civic Center Dr.
Santa Clara, CA 95050
(408) 496-0176
CIS Cobol, Level II Cobol

Telecon Systems
90 E. Gish Road, Suite 25
San Jose, CA 95112
(408) 275-1659
C

RR Software
P.O. Box 1512
Madison, WI 53701
(608) 244-6436
Janus (Ada subset)

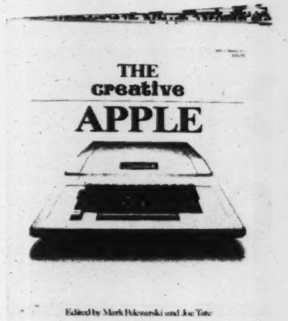
SofTech Microsystems
9494 Black Mountain Rd.
San Diego, CA 92126
(714) 578-6105
UCSD-Pascal, Fortran-77, Basic for the P-system

TeleSoft
10639 Roselle St.
San Diego, CA 92121
(714) 457-2700
Ada

Applied Analytics, Incorporated
8910 Brookridge Dr.
Upper Marlboro, MD 20772
(301) 627-6650
MicroSpeed (Forth dialect requiring 8087 co-processor)

ATTENTION APPLE® FREAKS!

Here's the book you've been looking for!



THE CREATIVE APPLE

The Creative Apple brings you 450 pages of the best articles and features on the Apple to appear in the past four years of *Creative Computing*. Revised and updated, this wealth of material gives you dozens of ways to tap the tremendous potential of your Apple, improve your programming skills, and expand your computing knowledge. Graphic utilities, animation, digitized images, music editing, educational software and applications, telecomputing, home control systems, VisiCalc and many other timely topics are thoroughly examined and discussed. Ready-to-run programs give you immediate use of this informative and stimulating collection, while a chapter on tips and tricks for easier programming lets you unlock the versatility of the Apple computer—and your own resourcefulness.

Whether for business, personal budgeting, the thrill of computer games or the development of educational applications, you'll find plenty here to help you get the most out of your Apple.

The Creative Apple, edited by Mark Pelczarski and Joe Tate. 8½" x 11", softcover, 450 pages, illustrated. $15.95.

Apple is a registered trademark of Apple Computer, Inc.

creative computing Dept. CN27
39 East Hanover Avenue, Morris Plains, NJ 07950

Please send me ________ copies of *Creative Apple* at $15.95 each* plus $2 postage and handling. #18R

All foreign orders (except Canada and Mexico) add $3 to regular postage and handling charge. Shipped airmail only.

*NJ residents add 5% sales tax.

☐ PAYMENT ENCLOSED $________
☐ CHARGE MY:
☐ American Express ☐ MasterCard ☐ Visa

Card No. ________ Exp. Date ________
Signature ________
Mr./Mrs./Ms. ________ (please print full name)
Address ________ Apt. ____
City ________
State ________ Zip ________

For faster service, PHONE TOLL FREE: 800-631-8112
(In NJ call 201-540-0445)

Institutions only—
Purchase orders under $50 not accepted.

DAISY WHEEL
TYPEWRITER/PRINTER
SMITH CORONA® ULTRASONIC™
Typewriter
including interface (parallel or serial)
Use with CBM®, PET®, APPLE®, VIC®, ATARI®, TRS-80®, XEROX®, ALTOS®, HP®, OSBORNE-1®, IBM®, ZENITH® and OTHERS

Excellent typewriter with automatic lift-off correction; changeable daisy print wheels only $4.95; 120 words per minute. ***Uses same print mechanism as Smith-Corona® TP-1™.*** *Rugged carrying case included.*

$799.00

Special prices on other interfaced typewriters.
BUSINESS MACHINE CONSULTANTS
Mailing address:
1735 N. Broadway - Walnut Creek, CA 94596
415-930-9600

CIRCLE 127 ON READER SERVICE CARD

RAM
For ATARI
48K RAM BOARD FOR THE 400
with Lifetime Warranty

- Highest quality available
- Reduces power consumption
- Reduces heat

48K Board (400) $240
32K Board (400/800) $100
FREE SHIPPING ANYWHERE IN U.S.A.

INTEC
PERIPHERALS
CORP
906 E. Highland Ave.
San Bernardino, CA 92404
(714) 881-1533

ATARI 400 800 are Trademarks of ATARI Inc

CIRCLE 190 ON READER SERVICE CARD

MAKE-A-FACE™

OVER
4 MILLION
COMBINATIONS

Combines your choice of each facial part to draw a face on your monitor.
FUN for kids of all ages
— Easy to operate —
For use with Apple® II + 48K & disk.
$24.95 on diskette at your computer store, or from:

SYSTEMS PLUS Inc.
of Maryland
5215 Grenock Drive
Lothian, MD 20711
(301) 437-4411

Apple is a registered trademark of Apple Computers, Inc.
MAKE-A-FACE is a trademark of SYSTEMS PLUS Inc. of Maryland

CIRCLE 300 ON READER SERVICE CARD

Personal Electronic Transactions

Gregory Yob

I am happy to hear from you, and encourage your correspondence. I will try to acknowledge all correspondence, and a SASE makes things easier for both of us. Please send your letters to "Personal Electronic Transactions" c/o PO Box 354, Palo Alto, CA 94301.

Get This Book!
Programming The PET/CBM *****

As some of you old timers remember, I was once working on a comprehensive book for the PET. This project will never be completed for a very good reason: there is a far better book now available. *Programming The PET/CBM* from Compute! Books ($24.95) is 504 pages of densely packed, thorough and complete information about our favorite machine. Hats off to Raeto Collin West who has given us this masterpiece.

Organizing the huge mass of material on the PET is a very difficult task and Mr. West has done an excellent job. The book is intended as a reference book; don't expect the step by step "do this, now do that" approach of beginning and intermediate books. Use the index (which is quite good) to find the item you need. If you try reading from cover to cover, be warned: if you are not an expert, much will be beyond your understanding.

Many, many machine language programs are given as practical examples. For example page 60 covers DUMP, which is not a Basic command, and gives a screen dump program in both Basic and 6502 code. I won't waste space saying more—*get this book.*

VIC Revealed ***

Once you have mastered the two books by Commodore on the VIC, there is another one for you to consider, if you have mastered Basic and are getting comfortable in machine language. *VIC Revealed* by Nick Hampshire for Skyles Electric Works ($15.00) contains most of the things you need to know about the VIC for writing games.

For truly advanced programming you will need a complete assembly listing. I do not know of one that is commercially available yet. (If you have one, let me know.)

Nine Ways To Write A Program Languages For The PET

As this issue of *Creative Computing* emphasizes languages, I collected all of the programming languages I could find for the PET. The virtues of different languages are described elsewere.

For comparison I decided to write the same program in each language, give you the code, and report on the performance of the language in running time, time to write the code, time to debug the code, and space used. See Figure 1 for the detailed comparisons. As for style, look at Figure 2 and decide for yourself which versions look best.

The benchmark program fills a 40-column screen with the character set starting with @ (zero POKED to the screen) and then repeats starting with A and so on until the screen has been filled 256 times. The jiffy clock is checked and the time is reported in seconds. Several of the languages did not have the PET clock so I used PEEKs to locations 141, 142 and 143 to read the clock directly. Some of the languages did not have floating point numbers so I merely print the PEEK values and used my calculator to convert into seconds.

I tried to write each program so its structure was as similar to the Basic program as possible. This does not provide the best way to do the program in each language. For example, the Pascal version ran twice as fast (i.e. 19 times faster than Basic) if the procedure DOAPAGE was eliminated and the equivalent code put in the main program. The star ratings for the languages merely indicate my personal feelings about the language.

PET/CBM Basic ***

It is only fair to begin with the language already in our PETs. On one hand, Basic has its problems, most of which relate to features I would like to have but don't. On the other, I can write Basic programs almost in my sleep because I have used it so much. Basic also serves as a marker for comparison with other languages, especially in program size and speed. The times required to write and debug the code were short due to my skill in Basic. The write and debug times in the other languages could be cut by a factor of three or four if the programmer were skilled in the language.

You've invested a lot of time and money into your computer . . .
It's time that investment paid off!

THE COLOR ACCOUNTANT

The Programmer's Institute introduces **THE COLOR ACCOUNTANT**, the only complete personal financial package specifically designed for the Atari 400/800 and the TRS-80 COLOR computers. This unique package includes:

1. **Complete Checkbook Maintenance**
2. **Chart of Accounts Maintenance**
3. **Income/Expense Accounts**
4. **Net Worth Statement**
5. **Payments/Appointments Calendar**
6. **Color Graph Design Package (graphs any files)**
7. **Stock Market Analysis**
8. **Home Budget Analysis**
9. **Decision Maker**
10. **Mailing List**

After the initial setup, **THE COLOR ACCOUNTANT** requires less than an hour of data input each month.

The checkbook maintenance program is the key to the entire package. Once your checkbook is balanced, the checkbook summary file will automatically update the home budget analysis, net worth, and income/expense statements. You can then graph any file, record bills and appointments, make decisions, print a mailing list, analyze various accounts or stocks, and even calculate taxes.

All programs are menu-driven and allow add/change/delete. Each file and statement can be listed to screen or printer, and saved to cassette or diskette. **THE COLOR ACCOUNTANT** also comes with 40 pages of documentation that leads you step-by-step through the entire package. The TRS-80 COLOR Ext. Basic requires 16K; the Atari 400/800 requires 24K for cassette and 32K for diskette **($74.95 cassette, $79.95 diskette).**

THE TAX HANDLER

The perfect supplement to **THE COLOR ACCOUNTANT**, ***The Tax Handler*** includes:

1. **Complete Form 1040**
2. **Schedule A (Itemized Deductions)**
3. **Schedule G (Income Averaging)**

This year let *The Tax Handler* prepare *your* taxes **($24.95 cassette, $29.95 diskette).**

See your local dealer or order direct:

THE PROGRAMMER'S INSTITUTE
a division of **FUTUREHOUSE**
P.O. BOX 3191, DEPT. A
CHAPEL HILL, NC 27514

1-919-489-2198
10 AM - 9 PM, Mon - Sat

CIRCLE 252 ON READER SERVICE CARD

Get better looking with your IBM.

Introducing the PC Pedestal™ from Curtis Manufacturing

Now you can get a real good look at your IBM Personal Computer or Displaywriter.

With Curtis Manufacturing's new PC Pedestal™ you can tilt or swivel the IBM display unit to suit yourself.

No more bobbing and weaving to avoid reflections. No more squinting to minimize glare.

The PC Pedestal™ virtually eliminates backache, eye strain, and fatigue. And that results in greater comfort and increased productivity all around.

Developed exclusively for the IBM Monochrome Display, the PC Pedestal™ is a perfect match in style, color & finish.

Best of all, when you see how little it costs to gain these benefits, you're going to be looking better already.

Extension Cables, too.

For even greater flexibility in arranging your system components, a 3-foot extension cable set is also available for your IBM display unit.

Manufacturing Company
CURTIS

For credit card orders
call: 1-800-824-7888
in California
1-800-852-7777
in Alaska & Hawaii
1-800-824-7919
ASK FOR OPERATOR 157

	PRICE	QTY.	AMOUNT
PC PEDESTAL™	$79.95		
EXTENSION CABLES	49.95		
postage per item	3.00		
CC1	TOTAL		

NAME ____________________
COMPANY ____________________
ADDRESS ____________________
CITY ____________ STATE ________ ZIP ________

MAIL TO:
Curtis Manufacturing Co.,
One Curtis Road, Winchester, NH 03470

☐ check ☐ money order ☐ Master Card ☐ VISA ☐ send additional information

account # ____________________ Master Card Interbank # ____________________

SIGNATURE ____________________ expiration date _____/_____ month year

CIRCLE 161 ON READER SERVICE CARD

Figure 1: Comparison Chart for Languages Benchmark.

Language	Time to Write (min)	Time to Debug (min)	Time to Run (sec)	Size in Bytes	Speed Ratio to Basic
PET Basic	7	3	4368.7	302	1.00
Comal	20	15	3097.0	Note 1	1.41
Petspeed	Note 2	Note 2	674.5	159	6.50
Oxford Integer	20	23	37.0	612	118.0
KMMM Pascal	45	60	460.1	556	9.5
Forth	30	30	151.9	Note 1	28.8
RPL	20	7	157.9	122	27.7
Vigil	45	20	2525.2	499	1.73
Assembler	35	25	6.1	105	716.2

Note 1: The size of the program wasn't easily determined.

Note 2: Use PET Basic plus 1 minute to compile.

Assembler is clearly the winner in execution time and space usage. The write and debug times for languages other than Basic reflect my inexperience with these languages. Divide these times by 2.5 if you are familiar with the language. Note that the program sizes do not include the space required by the run time packages of the languages. (For example, Petspeed needs about 8K for its runtime code package.)

Comal ****

Comal from the Comal User's Group is rather like a Basic with a zillion new features to play with and try out. I particularly liked the way Comal would insert understood syntax without my bothering with it. For example, X=5 would list as X:=5. Comal is a compiler, however, so debugging by direct commands like PRINT X will not work. A mixed blessing is its line by line checking of syntax. If you flub a line, Comal will yell at you immediately. In some ways, Comal is like Pascal with many of the niggling details removed. Comal is available for $47.50 for all Pets, including a ROM version for the 8032.

Petspeed Compiler *****

As I described Petspeed from Small Systems Engineering ($325) in an earlier column this will be brief. If you have already written and debugged your Basic program, Petspeed will read the disk version and compile it for you. The resulting program will run from three to ten times faster than the original. (Speed is highly variable depending on the kind of program you write. The benchmark runs 6.5 times faster than Basic.)

Oxford Integer Basic Compiler **

This compiler from Skyles Electric Works ($200) requires that your Basic program be limited to using integer values only. This is the beginning of many, many limitations, some of which border on the bizarre. The final blow is that you can't backup the master disk. The compiler is written in Basic, so it runs slowly (Challenge: compile this compiler in Petspeed.) Doing the current benchmark wasn't too hard, but it took its time going through recompilations for debugging.

OIB does have some nice features like the ability to write interrupt code (I used this for the clock) and "wedge" type routines. The speed is impressive; only assembler ran faster. If you need it, use it, but it isn't easy.

KMMM Pascal ****

There are several versions of Pascal around, most of which are really p-code interpreters. That is, the Pascal is translated into an intermediate language known as p-code and a run time program simulates the p-code machine. This will run four to six times faster than Basic. KMMM Pascal from Wilserv Industries ($85) and AB Computers is a true compiler with the output in machine language—and it runs faster.

One caution: KMMM Pascal is not the full Pascal as defined by Wirth. It has quite a bit more than Tiny Pascal, but some features, such as user definable types, are missing. A fuller version is under development.

Pascal takes getting used to, particularly in the details. Willi Kusche (author of KMMM Pascal) was very helpful in debugging the benchmark program and spotted some errors I would never have found.

Forth ****

I am an utter neophyte in Forth so its unusual style set me back a bit. I expect that some practice may convert me, though I find the code almost unreadable. (That is an advantage, for you have to *think* your way through a program. You can't skim—and miss things.) This version from AB Computers is a full FigForth including screens on the disk, which is an essential feature for the serious programmer. It costs $50.

Forth runs at about 30 times the speed of Basic, which is really noticeable. One warning: business or scientific number crunching is difficult in Forth. The extensibility of the language is nice and the availability of direct mode commands is most helpful in debugging.

RPL ***1/2

RPL (Reverse Polish Language) from Samurai Software ($49.95) is superficially like Forth in the style of programming used (I wrote the benchmark by using my Forth program and substituting the differently named operators). Internally, RPL compiles into p-code so programs of moderate size should take less space and run faster than Forth. This didn't show up in the benchmark I used.

RPL comes with an extensive debugging program ($39.95) which I didn't have time to examine closely. You can execute your program step by step and still use the original labels, which is nice. (Any assembler builders out there? A Symbolic Debugger for 6502 programs is greatly needed.)

Vigil *

Vigil from Abacus Software ($35) is touted as a way to write game programs which run more rapidly than Basic. Features for looking at the keyboard and user port (joystick), and rapid plotting in half-square graphics are included. The benchmark in Vigil is cryptic. I had to resort to some machine language to do the POKE to the screen. Vigil uses only 8-bit values, which I find is a negative feature.

Vigil also runs slowly, which was quite a disappointment, and is a very limited language. An apt comparison is Tiny Basic vs. Microsoft Basic. Vigil is available for the VIC.

6502 Assembler ***

Just to see for myself, I coded the equivalent program in assembly language,

Experience the Magazines of the Future . . . TODAY

MAGATARI™
for the Atari 400/800

TRC™
for the TRS-80 COLOR, Ext. Basic

appletree™
for the APPLE II+

The Programmer's Institute's magnetic magazines will entertain, educate, and challenge you.

Each issue features ready-to-load programs ranging from games, adventures, home applications and utilities to personal finance, educational, and our unique teaching programs. Our magazines include fully listable programs, a newsletter containing descriptions and instructions for all programs, and notes on programming techniques used.

"Received my first copy . . . it's great! Please rush to me one of each back issue, so I'll have a complete set."
R.G., Chicago, IL

"Not only are the games fun and the applications useful, but the quality of the programs is excellent."
S.P., Midwest Computer Software Sales

COMING SOON: VicVideo for the Vic-20 and PCM magazine for the IBM personal computer.
Plus Educational Software for the Atari 400/800.

ORDERING INFORMATION

Subscriptions*	Cassette	Diskette
Year	$50.00	$75.00
½ Year	$30.00	$45.00
Trial Issue	$10.00	$15.00

*** Add $2.00 postage and handling.**
ALL SOFTWARE REQUIRES 16K.
Note: Appletree is available only on diskette.

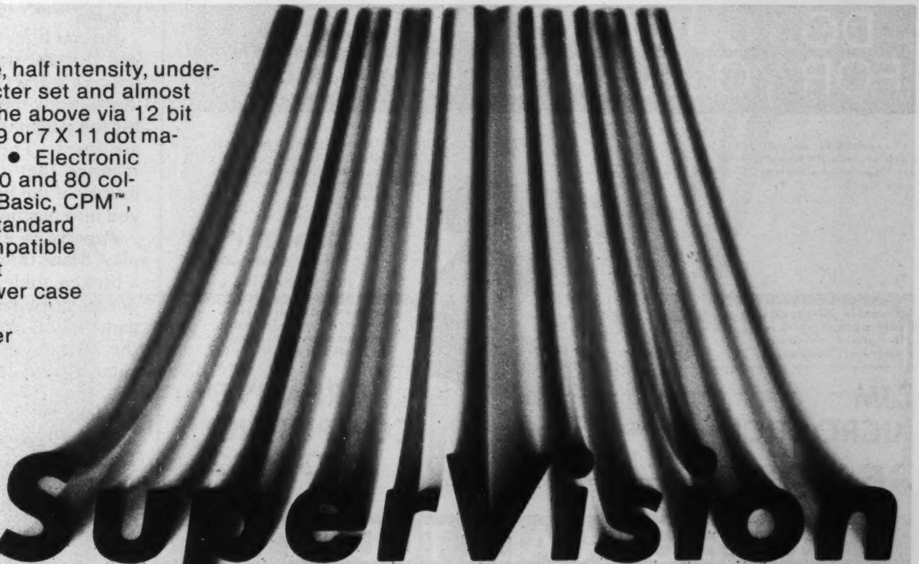
See your local dealer or order direct:
THE PROGRAMMER'S INSTITUTE
a division of FUTUREHOUSE
P.O. BOX 3191, DEPT. A
CHAPEL HILL, NC 27514

VISA MasterCard

1-919-489-2198
10 AM - 9 PM, Mon - Sat

CIRCLE 251 ON READER SERVICE CARD

- Attributes: inverse, half intensity, underline, alternate character set and almost any combination of the above via 12 bit X 2K memory
- 7 X 9 or 7 X 11 dot matrix with descenders
- Electronic switching between 40 and 80 columns
- Pascal 1.1 Basic, CPM™, Fortran, Cobol and standard Apple peripheral compatible
- 256 Character set
- Full upper and lower case letters with shift key detector
- And other features not listed, call for details.



An Apple™ 80 column board
By Techcom Enterprises
16819 So. Hawthorne Blvd.
Lawndale, Calif. 90260
CALL (213) 854-0583

Suggested Price **$350.00**

™Apple Computer Company, Inc.
™Digital Research, Inc.

CIRCLE 301 ON READER SERVICE CARD

and just to be nasty, I took advantage of th 6502 arithmetic to make my program a little bit faster. Machine code in this case is not a mere 100 times faster; it is *700* times faster. The assembler used was Bob Skyles's Macrotea, which is similar to Moser's ASSM/TED from Eastern House Software ($169.95).

High level languages are very worthwhile when it comes to saving my time as a programmer. Assembler is very worthwhile in its ultimate freedom regarding the machine and its speed.

Introducing Marc-Thomas Clifton

The following are some remarks by Marc-Thomas Clifton concerning adventure and fantasy role-playing (FRP) games for the PET. Marc will appear now and then in this column.

About Adventure and FRP Games

The Original Adventure was adapted to the PET by Jim Butterfield. Adventure is hard to find, but with a little help and a few friends, you should be able to obtain a copy.

Original Adventure rates five stars and is used as a standard for comparing the FRP games that I review. I look for a game in which I become involved in the character instead of looking at the computer screen. I like to find myself looking through my character's eyes; the information on the computer only aids my imagination. An FRP game with computer graphics is preferred, but is not necessary if the program gives an adequate description of what I see.

One of the qualities of Adventure is that you get a complete description the first time you visit a room, but on successive visits, you get a brief sentence "you are in the ... room." The game must be challenging mentally with various puzzles to solve, or challenging to my dexterity, where speed and quick reflexes are important.

I don't like to have my choice of actions limited to essentials such as direction and fight or run. I like to worry about the oil supply in my lantern, whether I'm thirsty or hungry, and when I have to heed nature's call. (How many FRP games have this feature?)

A variety of weapons with noticeable differences in effects and various potions and spells are essential to making the game believable. Also, the game must increase in difficulty as my character grows stronger. Usually this is done by having the character descend into the dungeon, where he meets more deadly monsters and other evils.

A good FRP or adventure game takes place in a complex world. There must be lots of interesting items that I can use, even if I don't know how to use them yet. The places must be interesting to visit with enough diversity so I can remember the dungeon or ground world without having to draw a map.

Dungeon of Death ****

Dungeon of Death from Instant Software includes three programs: title, dnd help, and dnd. Title displays a screen with the title and instructions on how to load the dnd help program, which in turn offers the instructions to dnd. The dnd help program is almost the same as the instruction booklet. The only useful thing in it is the option to display all twelve levels of the dungeon, which is useful in finding exits and stairways. Dnd is the actual *Dungeon of Death* game.

The instructions are very enjoyable to read, written informatively, without any non-essential comments, and extremely funny. Charts are included to tell you how effective magic attacks will be. The game itself kept my attention with amusing user comments and simple graphic displays. There are several options when entering combat, opening chests, or using magic. I found the game very relaxing, and was surprised when unexpected things happened.

Pagoda ****

Pagoda from the Alphoid Co. has excellent documentation, graphics, and user options, and is extremely challenging. The instructions themselves require that you list the command options, of which there are many. They are written in such a manner that they draw you into the history of the Pagoda, and of course, lure you into playing the game.

Pagoda is extremely challenging to play. Many things can happen to you, like a broken ankle, which can severely hamper your movement. I recommend this game highly, with the warning that both the instructions and the game will consume a great deal of time.

Explore **

The *Explore* package from Channel Data Systems contains five "stories." The first one, Self Tutor Practice, is well written, and fun to play, although it is only a demonstration game in which the computer tells you what to do. Of course, you can try other things too.

Mall Mixup is the second "story." In it you are placed on the Mall at Washington, DC. The object is to find the national treasures (which have been put in the wrong places by the curator) and put them back to into their appropriate buildings. I found this rather dull. Tank Battle is more

DO **YOU** WANT THE **BEST**
FOR YOUR **APPLE** OR **ACE** ?

"...suitable for use with games for which we normally recommend a switchtype joystick such as *Thief* and *Snack Attack*."

"To overcome the connector vulnerability problem, CJM has gone to rugged but more expensive Cinch Jones connectors...."

"...one of the few joysticks that could be substituted for a paddle in games which required precise adjustment (*County Fair*, *Tsunami*, etc "

"...the CJM Microstick is of excellent quality throughout its exceptionally easy movement coupled with the long throw may well make this the joystick of choice for you."

CJM
MICROSTICK
$59.95

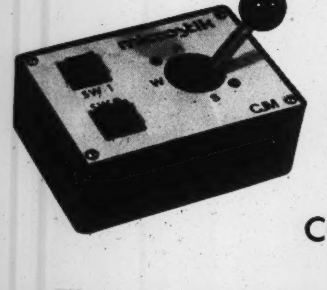
CREATIVE
COMPUTING
AUG 1982

WRITE OR CALL TODAY
CJM INDUSTRIES
PO BOX 436
STERLING VA. 22170
703/430-0354
DEALER INQUIRIES INVITED

VISA

master charge

CIRCLE 135 ON READER SERVICE CARD



IBM PERSONAL COMPUTER USERS

COMPLETE YOUR REFERENCE LIBRARY

Que On Systems
IBM's PERSONAL COMPUTER
que

Que On Systems

IBM's PERSONAL COMPUTER

Que Corporation's new 300 page book, IBM's PERSONAL COMPUTER describes the hardware, peripherals and IBM's program library. Whether you are an IBM Personal Computer user or prospective buyer, you will discover the significance of IBM's new product to your personal or business applications.

...at computer stores and fine book stores $14.95

and...

PERSONAL COMPUTER AGE
February 1982 ■ Vol. 1.2 ■ $2.00
The Definitive Journal For The IBM Personal Computer User

PERSONAL COMPUTER AGE

The Definitive Journal For The IBM Personal Computer User

Keeps you updated monthly with the latest news and applications for your IBM Personal Computer. Featuring: Hardware and Software Reviews — New Product Announcements — Technical Articles — Problem Reporting — Vendor Directory — Classified Ads — Special Interest Columns.

**$18.00/YR.
(12 issues)**

BOTH FOR ONLY $22.95

PERSONAL
COMPUTER
AGE

For Credit Card Orders, Dial Toll Free
(800) 227-2634 ext. 936
In California
(800) 772-2666 ext.936

☐ I Want Everything — PERSONAL COMPUTER AGE and IBM's PERSONAL COMPUTER for $22.95

☐ NEW ☐ RENEWAL

☐ Send the Book only for $14.95

☐ Just enter my subscription to PERSONAL COMPUTER AGE for $18.00

☐ Payment Enclosed

Charge my: ☐ VISA ☐ MASTER CHARGE

Card # ______

Expiration Date: ______

______

Authorized Signature

______

Name

______

Address

______

City

______

State Zip

PERSONAL COMPUTER AGE P.O. BOX 70725 Pasadena, California 91107 Dept. HC

CIRCLE 247 ON READER SERVICE CARD

enjoyable, mainly because the game is played on a hexagonal grid, which makes it easier to visualize.

Spelunker Beware is similar to Adventure. In it you must explore a cave that contains dangers, magic, and traps. The program is very large and a bit slow. Haunted Castle is the largest game, which caused it to limit your vocabulary. For example, north becomes N. This is easy to adjust to, especially if you have been using the shorthand form of the commands anyway.

Dunjonquest ***

The Automated simulations Dunjonquest games that I have played are *Morloc's Tower*, *Temple of Apshai*, and *The Datestones of Ryn*. All the games are similar in their introduction and setup of

Figure 2. The Same Benchmark Program Done Several Ways. The same program is written for each of the languages reviewed in the column. These examples show the writing styles for each language.

PET/CBM Basic

```
10 REM UNFAIR BENCHMARK
20 SC=32768:B=0:T=TI
30 FORA=0TO255
40 AD=SC:GOSUB100
50 AD=AD+256:GOSUB100
60 AD=AD+256:GOSUB100
70 AD=AD+256:GOSUB100
80 B=B+1:NEXTA
90 PRINT"TIME:"(TI-T)/60"SEC":END
100 REM DO ONE PAGE
110 FORP=0TO255
120 C=P+B:IFC>255THENC=C-256
130 POKEAD+P,C
140 NEXTP
150 RETURN
```

Comal

```
0010 // UNFAIR BENCHMARK DONE IN COMAL //
0020 // MAIN PROGRAM //
0030 //*
0040 SCREEN:=32768; BCOUNT:=0
0050 CLOCK:=141; TIME1:=FINDTIME(CLOCK)
0060 FOR ACOUNT:=0 TO 255 DO
0070   ADDR:=SCREEN
0080   EXEC DOAPAGE
0090   ADDR:=ADDR+256
0100   EXEC DOAPAGE
0110   ADDR:=ADDR+256
0120   EXEC DOAPAGE
0130   ADDR:=ADDR+256
0140   EXEC DOAPAGE
0150   BCOUNT:+1
0160 NEXT ACOUNT
0170 TIME2:=FINDTIME(CLOCK)
0180 TIME3:=(TIME2-TIME1)/60
0190 PRINT "TIME:",TIME3,"SEC"
0200 //*
0210 PROC FINDTIME(X)
0220   SUM:=PEEK(X)*256*256+PEEK(X+1)*256+PEEK(X+2)
0230   FINDTIME:=SUM
0240 ENDPROC FINDTIME
0250 //
0260 PROC DOAPAGE
0270   FOR PCOUNT:=0 TO 255 DO
0280     CVAL:=PCOUNT+ACOUNT
0290     IF CVAL>255 THEN CVAL:=CVAL-256
0300     POKE ADDR+PCOUNT,CVAL
0310   NEXT PCOUNT
0320 ENDPROC DOAPAGE
0330 //
```

Oxford Integer Basic

```
10   @SUBS 10000:@STRINGS=25000,30000
20   @MEM CO=11000 DA=20000 PT=23000 ST=23500
30   SCHED200
40   SC=32768:B=0:T=TI
50   FORA=0TO255
60   AD=SC:GOSUB120
70   AD=AD+256:GOSUB120
80   AD=AD+256:GOSUB120
90   AD=AD+256:GOSUB120
100   B=B+1:NEXTA
105   T2=TI-T:T3=T2/60
110   PRINT"TIME":PRINTT3:END
120   FORP=0TO255
130   C=P+B:IFC>255THENC=C-256
140   POKEAD+P,C
150   NEXTP
160   RETURN
200   TI=TI+1
210   RTI
```

KMMM Pascal

```
 (* UNFAIR BENCHMARK *)

 CONST SCREEN=$8000;
 VAR   ADDR,ACOUNT,BCOUNT : INTEGER;
       TIME,TIME1,TIME2 : REAL;

 FUNCTION FINDTIME : REAL;

    VAR LOOK1,LOOK2,LOOK3 : INTEGER;
        SUM : REAL;
    BEGIN LOOK1 := ORD(MEM[141]);
          LOOK2 := ORD(MEM[142]);
          LOOK3 := ORD(MEM[143]);
          SUM := 256 * LOOK1 + LOOK2;
          SUM := 256 * SUM + LOOK3;
          FINDTIME := SUM
    END;

PROCEDURE DOAPAGE;

    VAR PCOUNT,CVAL : INTEGER;
    BEGIN FOR PCOUNT := 0 TO 255
          DO BEGIN
          CVAL := PCOUNT + ACOUNT;
          IF CVAL > 255 THEN CVAL := CVAL - 256;
          MEM[ADDR + PCOUNT] := CHR(CVAL)
        END
    END;


    (* MAIN CODE *)

   BEGIN
      BCOUNT := 0;
      TIME1 := FINDTIME;
      FOR ACOUNT := 0 TO 255
              DO BEGIN
              ADDR := SCREEN; DOAPAGE;
              ADDR := ADDR + 256; DOAPAGE;
              ADDR := ADDR + 256; DOAPAGE;
              ADDR := ADDR + 256; DOAPAGE;
              BCOUNT := BCOUNT + 1
            END;
      TIME2 := FINDTIME;
      TIME := (TIME2 - TIME1) / 60;
      WRITELN('TIME:',TIME,'SEC')
   END.
```

Command Strategy Football

An exciting 2-player game that lets YOU BE THE COACH!

Easy for beginners and challenging for veteran armchair quarterbacks!

JUST $34.95 complete

Allow 3 weeks for delivery.

Comes complete with instruction book. Programmed for **APPLE II** and **APPLE II+** computer with 48K Ram FP.

Make check or money order payable to: **RANCO SOFTWARE GAMES, INC.** 4 Bartlett Ave., Roanoke, Al. 36274. For faster service on orders only call: **[205] 863-4718.**

Master Charge or Visa accepted. Please give card number and expiration date.

Ranco Software Games, Inc.

No. 4 Bartlett Ave.
Roanoke, AL 36274

*Apple is the trademark of the Apple Computer Corp.

CIRCLE 259 ON READER SERVICE CARD

FORTH–79

Ver. 2 For your APPLE II/II+

The complete professional software system, that meets ALL provisions of the FORTH–79 Standard (adopted Oct. 1980). Compare the many advanced features of FORTH–79 with the FORTH you are now using, or plan to buy!

FEATURES	OURS	OTHERS
79-Standard system gives source portability.	YES	
Professionally written tutorial & user manual	200 PG.	
Screen editor with user-definable controls.	YES	
Macro-assembler with local labels.	YES	
Virtual memory.	YES	
Both 13 & 16-sector format.	YES	
Multiple disk drives.	YES	
Double-number Standard & String extensions.	YES	
Upper/lower case keyboard input.	YES	
LO-Res graphics.	YES	
80 column display capability	YES	
Z-80 CP/M Ver. 2.x & Northstar also available	YES	
Affordable!	$99.95	
Low cost enhancement option:		
Hi-Res turtle-graphics.	YES	
Floating-point mathematics.	YES	
Powerful package with own manual, 50 functions in all, AM9511 compatible.		

FORTH–79 V.2 (requires 48K & 1 disk drive)	$ 99.95
ENHANCEMENT PACKAGE FOR V.2 Floating point & Hi-Res turtle-graphics	$ 49.95
COMBINATION PACKAGE	$139.95

(CA res. add 6% tax: COD accepted)

MicroMotion
12077 Wilshire Blvd. # 506
L.A., CA 90025 (213) 821-4340
Specify APPLE, CP/M or Northstar
Dealer inquiries invited.

CIRCLE 219 ON READER SERVICE CARD

Lyco Computer

Marketing & Consultants

ATARI

800 48K..... $ 699
400 16K..... $ 288

825 PRINTER	$585
410 RECORDER	$75
32K RAM	$89
4022 PAC MAN	$35
4011 STAR RAIDERS	$32
4012 MISSILE COMMAND	$29
4008 SPACE INVADERS	$29
4013 ASTEROIDS	$29
4006 SUPER BREAKOUT	$29
8130 CAVERNS OF MARS	$33
810 DRIVE	449
830 MODEM	$159
850 INTERFACE	$164
KRAZY SHOOTOUT	$35
EASTERN FRONT 41	$25
CENTIPEDE	$35
JOYSTICKS	$18
4018 PILOT HOME	$65
MICROSOFT BASIC	$69
PERSONAL FINANCE	$62

FREE COMMODORE VIC-20 PRODUCT CATALOG

VIC-20 ...$199

TO ORDER
CALL TOLL FREE
800-233-8760
In PA 1-717-398-4079

LYCO COMPUTERS
P.O. BOX 10
COGAN STATION, PA
17728

FREE ATARI CATALOG OF THIRD PARTY SOFTWARE PREPAID ORDERS SHIPPED FREE ALLOW PERSONAL CHECKS 4 WKS TO CLEAR ADD 3 FOR VISA OR MASTER CARD NO SALES TAX EXCEPT PA RESIDENTS ALL MERCHANDISE FULLY GUARANTEED PRICES SUBJECT TO CHANGE

CIRCLE 204 ON READER SERVICE CARD

PEEK & POKE

Software

☆ ATARI

	List	Our Price
Asteroids (cart)	34.95	27.60
Wizard of Wor (cart)	49.95	35.95
Missile Command (cart)	34.95	27.60
Deluxe Invaders (cart)	39.95	28.75
Star Raiders (cart)	44.95	34.60
Gorf (cart)	49.95	35.95
Space Invaders (cart)	34.95	27.60
Ultima II (D)	59.95	43.15
Frogger (D,C)	34.95	25.15
Track Attack (D)	29.95	21.55
Bug Attack (D,C)	29.95	21.55
Temple of Apshai (D,C)	39.95	28.75
Text Wizard (D)	99.95	71.95
Visicalc 3.3 (D)	250.00	195.00

☆ IBM

Deadline (D)	49.95	35.95
Zork I or II (D) ea	39.95	28.75
Galaxy (D)	25.00	18.00
Voyager (D)	25.00	18.00
Temple of Apshai (D)	39.95	28.75
Frogger (D)	34.95	25.15
Conquest (D)	29.95	21.55
Draw Poker (D)	21.00	15.10
Visi File (D)	250.00	195.00
Write On (D)	129.95	93.55
Tax Manager	250.00	180.00
Easy Writer II	350.00	251.95
Super Calc	295.00	212.40

☆ APPLE II

	List	Our Price
Deadly Secrets (D)	34.95	25.15
Tunnel Terror (D)	29.95	21.55
Firebug (D)	24.95	17.95
Frogger (D)	34.95	25.15
Cytron Masters (D)	39.95	28.75
Pinball A2-PB1 (D)	29.95	23.35
Wizardry (D)	49.95	35.95
Knight of Diamonds (D)	34.95	25.15
Choplifter (D)	34.95	25.15
S.A.G.A.1,2 or 3 (D) ea	29.95	21.55
Ultima (D)	39.95	28.75
Ultima II (D)	53.95	43.15
Deadline (D)	49.95	35.95
Zork I or II (D)	39.95	28.75
Master Type (D)	39.95	28.75
Personal Finance Sys (D)	125.00	90.00
PFS: Report (D)	95.00	68.40
DB Master (D)	229.00	164.85
Wordstar (D) (CP/M)	375.00	230.65

☆ TRS-80

Hellfire Warrior (D,C)	39.95	28.75
Vaults of Cymarron (C)	39.95	28.75
Lost Colony (D,C)	29.95	21.55
Sargon II (Mod III) (D)	34.95	25.15
Scarfman (Color) (C)	19.95	14.35
Maxi-Stat (D)	199.95	144.00
Superscript (D)	50.00	36.00
Mathemagic (D)	89.95	64.75

Cert. Ck., M.O., Visa, M.C., (Incl. card # and exp. date), pers. ck. (add 2 wks). Shipping add $2.00. C.O.D. add $3.00.
No C.O.D. over $200.00
Wyo. res. add 4%. Prices subject to change.

Hawaii and Alaska shipping is $5.00

Foreign Orders - 10% of merchandise total (in U.S. currency)

★ **FREE PRICE LIST**
COMPLETE CATALOG.....$2.00

711 RANGER DRIVE
CHEYENNE, WY 82009
PHONE [307]635-1849

Apple, Atari, TRS-80, IBM and Visicalc are Registered Trademarks.

CIRCLE 243 ON READER SERVICE CARD

PET/VIC, continued...

character, graphics, and combat with various monsters.

The introduction is well written, allowing you to choose your own character's makeup or have the computer create one for you. Like the actual FRP games played without computers, your character has intelligence, intuition, ego, strength, constitution, and dexterity. In The *Temple of Apshai*, you have several gold pieces with which to barter for equipment and food. (I laughed during the entire bargaining process with the innkeeper.)

The instructions are well written with tables to show you the command list and descriptions of the importance of intelligence, fatigue, strength, and other attributes. The graphics are fairly well done using the quarter square blocks to draw the walls and your position on the screen. Your character's direction is shown, which is useful in moving and looking at walls. The upper right of the screen displays a constant update of your character and combat status.

Although the Dunjonquest software is detailed, it does not play smoothly. I found command entry to be slow and confusing. I could type a sequence of commands, and then have to repeat all of it before entering a new command. The game becomes routine after a while: enter a room, fight the monsters, check out the treasures, check the walls for hidden doors, go to the next room. The graphics don't vary enough to keep my attention. The character tires (and dies), easily and the various combat options don't really make much difference.

Micro Warrior *****

Micro Warrior from Instant Software is excellent—fun, challenging, suspenseful. The entire program is written in machine language (and it works on any PET/CBM except 8032), so it works fast and well. The graphics are updated on the screen instantly, and combat with the monsters is quick and dangerous.

Furthermore, your selection of weapons has an important effect on the damage you can inflict. You also have a choice of several cleric and magic spells which can be used to cure yourself, fight, or improve your own abilities. The instructions are concise and easy to read. This is the best FRP game that incorporates real time graphic displays and action I have ever seen.

SwordQuest **

SwordQuest from Fantasy Game Software includes graphics and sound (if you have a speaker connected to CB2), and takes place in real time. Written in Basic, *SwordQuest* takes time to update a monster's movement. The game starts at its hardest level. Fortunately, the instructions tell you how to change the difficulty level

Figure 2., continued...

Forth

```
: CLEAR 32 32768 DUP 1024 + SWAP DO DUP I C! LOOP DROP ;
: DOAPAGE DUP 256 + SWAP DO 1 + DUP I C! LOOP DROP ;
: 2DUP OVER OVER ;
: DOSCREEN 32768 256 - 4 0 DO 256 + 2DUP DOAPAGE LOOP DROP ;
: DOALL 255 0 DO I DOSCREEN DROP LOOP ;
: CLOCK 141 C@ 142 C@ 143 C@ ;
: DOBENCH CLOCK DOALL CLOCK CLEAR . . . . . . ;
DOBENCH
```

RPL

```
20 CLOCK &
30 DOALL &
40 CLOCK &
50 CLEAR &
60 STR$ PRINT " " PRINT
70 STR$ PRINT " " PRINT
80 STR$ PRINT "  " PRINT
90 STR$ PRINT " " PRINT
100 STR$ PRINT " " PRINT
110 STR$ PRINT " " PRINT
120 STOP
130 CLOCK: 141 PEEK 142 PEEK 143 PEEK RETURN
140 CLEAR: 32 32768 # 1024 + %
150 FOR # FN POKE NEXT . RETURN
160 DOALL: 255 0 FOR FN DOSCREEN & . NEXT RETURN
170 DOSCREEN: 32768 256 - 4 0 FOR 256
180 + ; ; DOAPAGE & NEXT . RETURN
190 DOAPAGE: # 256 + % FOR 1 +
200 # FN POKE NEXT .. RETURN
```

Vigil

```
1 SYS826
2 E
5 REMBENCHMARK
10 REM BENCHMARK IN VIGIL
20 REM GET TIME
30 RD141
40 RE142
50 RF143
60 LETP0
70 LETQ0
80 LETK0
90 LETN1
100 REM SET UP MACH LANG
110 POKE20000,"A9008D008060"
120 E
130 REM MAIN LOOP
140 LETM128
150 KM20004
160 GOSUB400
170 IM1
180 KM20004
190 GOSUB400
200 IM1
210 KM20004
220 GOSUB400
230 IM1
240 KM20004
250 GOSUB400
260 IQ1
270 +KN
280 #Z0
290 GOTO140
300 RG141
310 RH142
320 RI143
330 E
340 W
350 STOP
```

```
390 REM DO ONE PAGE TO SCREEN
400 LETJ0
410 =PQ
420 KP20001
430 KJ20003
440 USR20000
450 IP1
460 +JN
470 #Z0
480 GOTO420
490 RETURN
1000 REM VIGIL REGISTER USAGE
1010 REM D E F INITIAL PET CLOCK
1020 REM G H I FINAL PET CLOCK
1030 REM P VALUE POKED TO SCREEN
1040 REM Q START VALUE FOR P
1050 REM J DOAPAGE COUNTER
1060 REM K MAIN LOOP COUNTER
1070 REM MACHINE LANGUAGE IS:
1080 REM
1090 REM LDA #CHAR
1100 REM STA SCRADDR
1110 REM RTS
1120 REM
1130 REM M IS HI BYTE IN SCRADDR
1140 REM N IS THE INTEGER 1
```

SAVE $$ **DISCOUNT PRICES** SAVE $$

apple computer

APPLE COMPUTER SYSTEMS SOLD ONLY IN STORE. CALL FOR PRICES.

RAM MEMORY

FOR TRS-80, APPLE II 16K SET 4116's (200 NS)	24.95

General Information:

We carry a large selection of hardware and software by other companies. Send for our catalog.

We are an authorized repair center for **APPLE, ATARI, NORTH STAR, AND EPSON.**

ATARI

400 16K	349.00
800 16K	699.00
410 Recorder	89.00
810 Disk	449.00
822 Printer	359.00
825 Printer	779.00
830 Modem	159.00
850 Interface Module	179.00
CX853 RAM	89.00
CX70 Light Pen	64.00
CX30 Paddle	18.00
CX40 Joystick	18.00

VERBATIM DISKETTES

Box of 10 5¼"	29.50
Box of 10 8"	39.50

NorthStar™

ADV-2Q-64K	3150.00
ADV-1Q-64K-HD-5	5195.00
HRZ-2Q-64K	2795.00
HRZ-1Q-64K-HD-5	4695.00
HRZ-1Q-64K-HD-18	6295.00
5 MB HARD DISK	2350.00
18 MB HARD DISK	4195.00

PRINTERS

EPSON	
MX-70	299.00
MX-80	469.00
MX-80 F/T	569.00
GRAFTRAX	90.00
INTERFACE (APPLE)	75.00
CABLE (APPLE)	22.50
IDS	
560G	1450.00
PRISM	1795.00
NEC	
3510 35CPS	1995.00
7710 55CPA	2650.00
8023A	599.00
OKIDATA	
MICROLINE 80	389.00
MICROLINE 82A	549.00
MICROLINE 83A	849.00
MICROLINE 84	1245.00
C.I.T.O.H.	
STARWRITER 25CPS	1595.00
STARWRITER 45CPS	2195.00
FORMS TRACTOR	275.00

PRICES SUBJECT TO CHANGE WITHOUT NOTICE. MARYLAND RESIDENTS ADD 5% SALES TAX

FREDERICK COMPUTER PRODUCTS, INC.

TO ORDER CALL:
(301) 694-8884

Store Hours:

MON. THRU THURS.	9:30 AM-9:00 PM
FRI. AND SAT.	9:30 AM-5:00 PM

5726 INDUSTRY LANE FREDERICK, MD. 21701

CIRCLE 175 ON READER SERVICE CARD

NOW YOU AND YOUR COMPUTER CAN SPEAK THE SAME LANGUAGE!

LET THESE GUIDES SHOW YOU HOW

NEW!

A GUIDE TO PROGRAMMING IBM PERSONAL COMPUTER Bruce Presley

Everything you need is here on how to program IBM personal computers in IBM BASIC. This manual provides numerous review exercises, a series of programs for business applications, tips on how data searches are performed, and guidelines on computer game programming, the disk operating system, subroutines, color graphics, and much more. *210 pages, 8½ x 11, $12.95 paper From Lawrenceville Press*

A GUIDE TO PROGRAMMING IN APPLESOFT® Bruce Presley

Now everyone can master Applesoft® — the computer language for Apple computers that uses standard English words and phrases as commands. This practical handbook covers all aspects of starting, saving, recalling, and storing programs and data. Problem sets and review exercises accompany the handbook's coverage of the disk operating system, computer game programming, and more. *196 pages, 8½ x 11, $12.95 paper From Lawrenceville Press*

A GUIDE TO PROGRAMMING IN LEVEL II BASIC Bruce Presley

NEW!

Packed with helpful review exercises and problem sets, this instructive guide explains how to program Radio Shack TRS-80 computers in Level II BASIC — a language that uses standard English words as commands. Key areas examined include computer game programming, graphics, and the disk operating system. *190 pages, 8½ x 11, $12.95 paper From Lawrenceville Press*

VNR **VAN NOSTRAND REINHOLD**

VNR **VAN NOSTRAND REINHOLD,** Mail Order Service
7625 Empire Drive, Florence, KY 41042

Send me the book(s) checked below for a **15-DAY FREE EXAMINATION.** At the end of 15 days, I will pay the purchase price plus local sales tax and a small delivery and handling charge -- or return the book(s) and **OWE NOTHING.**

SAVE MONEY! Check here if enclosing payment with order and publisher pays postage and handling. Same 15-day return-refund guarantee. Be sure to add local sales tax with payment.

25892-5 A Guide to Programming in Level II BASIC	paper $12.95
26015-6 A Guide to Programming IBM Personal Computer	paper $12.95
25890-9 A Guide to Programming in Applesoft®	paper $12.95

Name
Address
City State Zip

Offer good in U.S.A. only and subject to credit department approval. Prices subject to change. C7407

CIRCLE 307 ON READER SERVICE CARD

PET/VIC, continued...

and the number of monsters. The game is similar to Chase, an old *Creative Computing* game in which electronic computers chased you around a maze and tried to electrocute you. At least the graphics keep my interest.

Death Star ***

This game is more fun than *SwordQuest*, because you get to blast robots, and they get to blast you. It takes some skill, because you can hide behind walls, shoot rapid-fire, and rescue a princess, who is very grateful if you make it to the escape hatch. ☐

Firms Mentioned in this Column

Compute! Books
P.O. Box 5406
Greensboro, NC 27403

Skyles Electric Works
231-E South Whisman Rd.
Mountain View, CA 94041

Comal User's Group
5501 Groveland Ter.
Madison, WI 53716

Small Systems Engineering
222 B. View St.
Mountain View, CA 94041

Wilserv Industries
P.O. Box 456
Bellmawr, NJ 08031

AB Computers
252 Bethlehem Pike
Colmar, PA 18915

Samurai Software
P.O. Box 2902
Pompano Beach, FL 33062

Abacus Software
P.O. Box 7211
Grand Rapids, MI 49510

Eastern House Software
3239 Linda Dr.
Winston-Salem, NC 27106

Instant Software
Peterborough, NH 03458

The Alphoid Co. Ltd.
42 Windsor Crescent
South Harrow, Middlesex, England

Channel Data Systems
5960 Mandarin Ave.
Goleta, CA 93017

Automated Simulations
P.O. Box 4232
Mountain View, CA 94040

Figure 2., continued...

6502 Assembler

```
10 REM DRIVER BASIC PROGRAM FOR BAD BENCHMARK
20 REM DONE IN ASSEMBLY LANGUAGE
30 REM NOTE - MUST HAVE OBJECT CODE LOADED AT $7000
40 AD=7*4096:REM SYS ADDRESS
50 DEF FNJ(X)=PEEK(X+2)+256*(PEEK(X+1)+256*PEEK(X))
60 P1=AD+99 :REM FIRST TIME SAVED HERE
70 P2=P1+3 :REM SECOND TIME HERE
80 REM AT LAST WE DO IT
90 SYSAD
100 PRINT(FNJ(P2)-FNJ(P1))/60

            0010;THIS IS THE BAD BENCHMARK DONE IN ASSEMBLY LANGUAGE
            0020;USING THE SKYLES MACROTEA
            0030;COPYRIGHT 1982 BY GREGORY YOB
            0040;
            0050;VARIOUS DEFINITIONS
            0060;
            0070 .CE ;CONTINUE ASSEMBLY IF ERRORS SEEN
            0080 .OS ;LOAD CODE INTO RAM ON ASSEMBLY
            0090SCREEN .DI $8000 ;START OF SCREEN
            0100PTR .DI $6E
            0110TIME .DI $8D ;PET TIME CLOCK
            0120 .BA $7000
7000-AD8D00 0130START LDA TIME ;READ THE TIME BYTES
7003-8D6370 0140 STA TIME1
7006-AD8E00 0150 LDA TIME+1
7009-8D6470 0160 STA TIME1+1
700C-AD8F00 0170 LDA TIME+2
700F-8D6570 0180 STA TIME1+2 ;AND SAVE IN TIME1
            0190;
            0200;NOW FOR THE MAIN LOOP
            0210;
7012-A200   0220 LDX #0
7014-A900   0230MLOOP LDA #L,SCREEN ;SET POINTER
7016-856E   0240 STA *PTR
7018-A980   0250 LDA #H,SCREEN
701A-856F   0260 STA *PTR+1
701C-204D70 0270 JSR SLOOP ;INNER LOOP
701F-A981   0280 LDA #H,SCREEN+$100
7021-856F   0290 STA *PTR+1
7023-204D70 0300 JSR SLOOP
7026-A982   0310 LDA #H,SCREEN+$200
7028-856F   0320 STA *PTR+1
702A-204D70 0330 JSR SLOOP
702D-A983   0340 LDA #H,SCREEN+$300
702F-856F   0350 STA *PTR+1
7031-204D70 0360 JSR SLOOP
7034-EE6170 0370 INC CHAR ;GO TO NEXT STARTING CHARACTER
7037-E8     0380 INX
7038-D0DA   0390 BNE MLOOP ;END OF MAIN LOOP
703A-AD8D00 0400 LDA TIME ;READ THE TIME BYTES
703D-8D6670 0410 STA TIME2
7040-AD8E00 0420 LDA TIME+1
7043-8D6770 0430 STA TIME2+1
7046-AD8F00 0440 LDA TIME+2
7049-8D6870 0450 STA TIME2+2 ;AND SAVE IN TIME2
704C-60     0460 RTS ;END OF CODE IF CALLED BY SYS
            0470;
            0480; INNER LOOP TO DO 256 CHARACTERS
            0490;
704D-AD6170 0500SLOOP LDA CHAR ;GET START CHAR
7050-8D6270 0510 STA CHAR1
7053-A000   0520 LDY #0
7055-916E   0530SLOOP1 STA (PTR),Y ;PRINT ON SCREEN
7057-EE6270 0540 INC CHAR1
705A-AD6270 0550 LDA CHAR1
705D-C8     0560 INY
705E-D0F5   0570 BNE SLOOP1
7060-60     0580 RTS
            0590;
            0600;STORAGE DEFINITIONS
            0610;
705E-00     0620CHAR .BY 0
705F-00     0630CHAR1 .BY 0
7060-000000 0640TIME1 .BY 0 0 0
7063-000000 0650TIME2 .BY 0 0 0 ;TIMES FOR RECOVERY IN BASIC
            0660 .EN

SCREEN=8000         PTR=006E
TIME=008D           START=7000
MLOOP=7014          SLOOP=704D
SLOOP1=7055         CHAR=7061
CHAR1=7062          TIME1=7063
TIME2=7066
//0000,7066,7066
```

THE VOICE OF THE FUTURE . . . HEAR TODAY

Echo Speech Synthesizers

Now your computer can talk with an ECHO™ speech synthesizer from Street Electronics!

Our SPEAKEASY™ phoneme system provides unlimited vocabulary while using a minimum of memory. The TEXTALKER™ text-to-speech firmware allows you to simply type in a word or phrase and let the computer do the rest. With nearly 400 grammatical rules contained in the system, your computer can properly pronounce most correctly spelled words. Simple commands allow you to select from:

- Entire words pronounced or spelled letter by letter
- Different volumes
- Spoken punctuation if desired
- 63 different pitch levels
- Words spoken monotonically or with intonation
- Fast or slow speech output

The applications of the ECHO speech synthesizer are virtually unlimited, ranging from business and education to games to aiding the handicapped. The ECHO][which plugs into the Apple][is priced at **$199.95.** The ECHO-GP is a complete stand alone unit which is compatible with most any computer; it sells for **$369.95.**

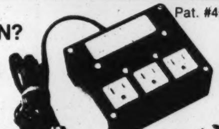
Street Electronics Corporation
1140 Mark
Carpinteria, California 93013
(805) 684-4593

SEC
ECHO-GP
ON OFF
VOLUME
ECHO][

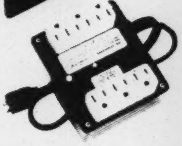
CIRCLE 292 ON READER SERVICE CARD

DISK DRIVE WOES?
PRINTER INTERACTION?
MEMORY LOSS?
ERRATIC OPERATION?

Pat. #4,259,705


ISO-1

Don't Blame The Software!


ISO-2

Power Line Spikes, Surges & Hash could be the culprit! Floppies, printers, memory & processor often interact! Our patented ISOLATORS eliminate equipment interaction AND curb damaging Power Line Spikes, Surges and Hash. MONEY BACK GUARANTEE!

• ISOLATOR (ISO-1) 3 filter isolated 3-prong sockets; integral Surge/Spike Suppression; 1875 W Maximum load, 1 KW load any socket	$69.95
• ISOLATOR (ISO-2) 2 filter isolated 3-prong socket banks; (6 sockets total); integral Spike/Surge Suppression; 1875 W Max load, 1 KW either bank	$69.95
• SUPER ISOLATOR (ISO-3) similar to ISO-1 except double isolation & Suppression	$104.95
• SUPER ISOLATOR (ISO-11) similar to ISO-2 except double isolation & Suppression	$104.95
• MAGNUM ISOLATOR (ISO-17) 4 Quad Isolated sockets; For ULTRA-SENSITIVE Systems	$181.95
• CIRCUIT BREAKER, any model (Add-CB)	Add $9.00
• REMOTE SWITCH, any model (Add-RS)	Add $16.00

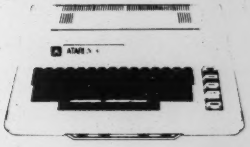
AT YOUR DEALERS

MasterCard, Visa, American Express
ORDER TOLL FREE 1-800-225-4876
(except AK, HI, PR & Canada)

ESP Electronic Specialists, Inc.
171 South Main Street, Box 389, Natick, Mass. 01760
(617) 655-1532

CIRCLE 170 ON READER SERVICE CARD

ATARI
A Warner Communications Company



800 (16K)	**$649.00**
400 16K	**279.00**
400 YOURS to 32K or 48K	**CALL**
410 RECORDER	**79.00**
810 DISK DRIVE	**449.00**
850 INTERFACE	**165.00**
830 MODEM	**149.00**
825 PRINTER	**575.00**
481 ENTERTAINER KIT	**79.00**
484 COMMUNICATOR KIT	**309.00**
PRINTERS — Atari, Epson, Smith Corona	**CALL**

Prices subject to change without notice.
Shipping extra. No tax out of state.
Ca. residents add appropriate taxes.

WE ARE AN AUTHORIZED ATARI SALES AND SERVICE CENTER

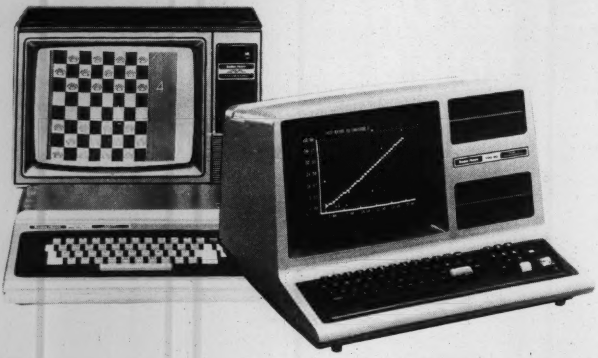
COMPUTERTIME, INC.

P.O. Box 216
Kentfield, CA 94914

CALL TOLL-FREE	**800-227-2520**
In California	**800-772-4064**

For product and price list: send $2.00 for shipping.

CIRCLE 149 ON READER SERVICE CARD



trings...trs-80 strings...trs-8

Stephen B. Gray

Elevated at 45 degrees from the horizontal, the TRS-80 cannon shoots down seven targets: two printers, a print utility, two games and a personal finance aid from Acorn, and a short one that may keep you guessing a while. (Just in case you are a new reader, this is the 45th column.)

Printers

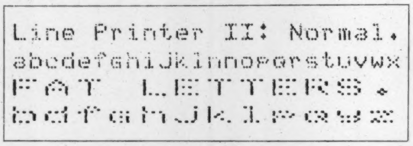
Radio Shack offers a variety of printers for the TRS-80, and many more are available from other sources. Lowest in cost are the dot-matrix printers, such as Radio Shack's Line Printer II (June 1980, p. 170), first seen at $970 in the RSC-3 catalog of 1979, and last seen at $799 in the RSC-5 catalog of 1981.

Line Printer II, which was the Centronics 730 with a Radio Shack label, was limited in features. It printed upper and lower case letters, 50 a second, in a 7 x 7 dot-matrix format with no descenders, which wasn't all that easy to read. It could also print expanded (wide) characters under software control (Figure 1). That's all it could do, but it operated in both friction-feed and pin-feed modes, and was Radio Shack's cheapest printer using ordinary paper (there used to be several inexpensive printers using aluminum-coated paper less than 5 inches wide). Although not intended for heavy, constant use in a business environment, Line Printer II was (and is) a real workhorse for limited applications, and I have been using mine to print out program LISTings, in uppercase letters, for this column since the May 1980 issue.

In the latest catalog I have on hand, RSC-7, the lowest-price dot-matrix printer is Line Printer VII, at $399. It is similar to Line Printer II, with no descenders for its regular and expanded characters, and prints 30 characters a second. However, it has a bit-image mode that allows printing high-density graphic information, such as from a high-resolution Color Computer display, at 3780 dots per square inch.

Line Printer VIII

For twice as much money, you can get a Radio Shack dot-matrix printer with a fascinating variety of features. Line Printer VIII (Figure 2), at $799, offers proportional spacing, elongated or condensed characters, underlining, superscripts, subscripts, backspacing, 32 special and "international characters" (letters with accent marks) for European use, 64 Japanese katakana characters, and 30 graphics characters (Figure 3). The printer has a word-processing mode, for high-quality printing, using a variable dot-matrix format, with up to 9 x 23 dots; it also has a fast printout, in data processing mode, using an 8 x 9 matrix.



```
Line Printer II: Normal.
abcdefghijklmnopqrstuvwx
F A T   L E T T E R S .
b d f g h j k l p q y z
```

Figure 1. Examples of printing with Line Printer II, showing the lack of descenders in both regular and expanded characters.

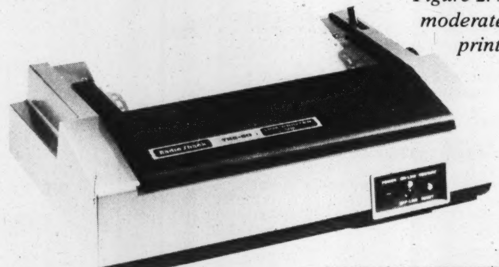
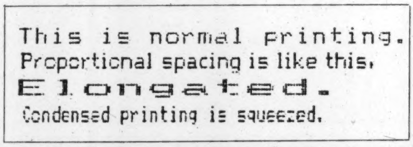


Figure 2. Line Printer VIII is a moderately priced dot-matrix printer with a very useful range of features.



```
This is normal printing.
Proportional spacing is like this.
E l o n g a t e d .
Condensed printing is squeezed.
```

Figure 3. The character set of Line Printer VIII includes Roman letters in various shapes, Japanese characters, and graphics blocks.

II + II = (BUSINESS DYNAMICS)

DOSPLUS II and the TRS-80 model II. The Dynamic Duo.

The TRS-80 model II was created to help you take care of your business. DOSPLUS II was created to help your TRS-80 help you and your business even more.

DOSPLUS II replaces your O.E.M. dos with an ultra-sophisticated operating system that is 5 or more times faster, more reliable and is totally compatible with all standard business oriented software designed for use with the model II. The result is a computer/operating system that far exceeds manufacturer's specs—with more potential and more capacity to be of service to you.

DOSPLUS II operating systems are available for either your floppy or hard disk drives. The hard drive operating system is compatible with Radio Shack, QuCeS, Corvus Micro Mainframe, VR Data and other popular hard drive sub-systems.

DOSPLUS II . . . All the quality and dependability you'd expect from DOSPLUS.

Dealer inquiries invited.

$249.95

DOSPLUS II

DOSPLUS first in quality! First in the industry!

POWERSOFT
A Division of Breeze/QSD, Inc.
11500 Stemmons Fwy., Dallas, Texas 75229
To order call toll free 1-800-527-7432
For product information (214) 484-2976

MSS inc.

MICRO SYSTEMS SOFTWARE, INC.
4301-18 Oak Circle
Boca Raton, FL 33431
To order call toll free 1-800-327-8724
For product information (305) 983-3390

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

CIRCLE 223 ON READER SERVICE CARD

There is a catch, though. Those fine features aren't all that easy to use. What is worse, the manual makes them seem even more complicated than they really are, having been written more for an engineer than for a businessman or a hobbyist.

The first dozen pages, all about setting up Line Printer VIII, are straightforward and fairly simple. Then the manual gets into operating the printer, and within a page or two manages to confuse most readers with some rather obtuse sentences and long paragraphs about control codes, character font selection, a mystifying page on line feed, and then some really mysterious esoterica about positioning, proportional spacing and such. A computer user buys what he thinks is a fairly simple printer, and then finds out, from the manual, that he has something about as simple to learn to use as a Learjet.

But wait, there seems to be some hope. Page 35 is the beginning of a section on Programming Information, and for a moment you think, "Here's where they make it simple for those of us who didn't major in Computer Science." Wrong again! Fourteen examples are given. Not "printing examples," but "programming examples," which should be a clue that there is no simple way to use Line Printer VIII. Turns out you have to use LPRINT and CHR$ to do anything other than simple, straightforward printing. However, one of the most maddening things about this maddening manual is that there is no simple chart of the CHR$ commands. You have to figure out which is which from the programming examples. That is, unless you realized that the decimal codes cleverly concealed in the Control-Code Summary chart back on page 24 are the CHR$ codes to use.

Okay, once you figure out the proper CHR$ codes, you realize they have to be used *each and every time* you want to switch from one mode to another. To print a simple chemical formula involving five compounds using subscripted numbers and superscripted plus and minus signs, takes 35 CHR$ codes. To make things worse, the whole thing is in Basic, as are all the "programming examples." Suppose you want to use some of these fascinating features in *Scripsit*. There isn't one single mention of *Scripsit* in the entire manual. If you have high blood pressure and no engineering degree or electromechanical inclination, don't open this manual; it is the most complicated I have yet seen come out of Fort Worth. Apparently they don't believe in trying out their manuals on ordinary folk before publication.

To start elongated printing, you have to use

```
CHR$(27); CHR$(14)
```

and to go back to normal printing, use

```
CHR$(27); CHR$(15)
```

while to start proportional spacing you need

```
CHR$(27); CHR$(17)
```

and to go to condensed printing requires

```
CHR$(27); CHR$(20)
```

and then, to get back to ordinary printing

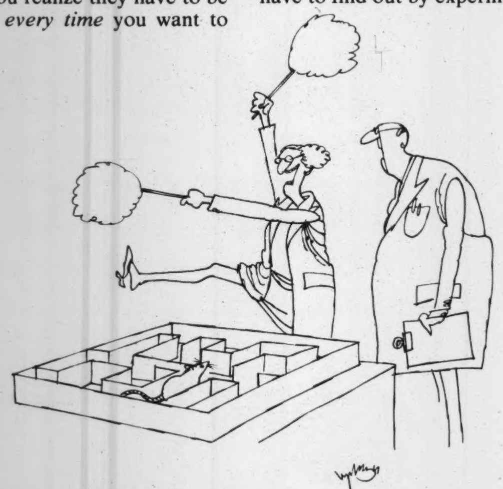
```
CHR$(27); CHR$(19).
```

To print the chemical formula for water, H_20, takes

```
LPRINT"H"; CHR$(27); CHR$(28);
"2"; CHR$(27); CHR$(30);"0"
```

with the CHR$(28) required for a "half forward line space," meaning moving the paper up half a space, and the CHR$(30) required for a "half reverse line space," which moves the paper back down the half-space. Got all that? If you do, and are willing to go through it all, and in Basic yet, you're a better man than I am, Gunga Din.

Yes, some of the features—but only a few—can be used in Scripsit, which you have to find out by experimenting.



"...I think he's doing all right without a cheering section..."

However, as usually happens when Radio Shack omits an important feature, such as not telling you how to use a printer with *Scripsit*, an independent, outside company offers help.

Scriplus To The Rescue

One of the most interesting and useful print utility programs available is from Powersoft (11500 Stemmons Expressway, Dallas, TX 75229): *Scriplus 3.0* ($39.95 plus $5 for shipping and handling).

Scriplus 3.0 is "a modification to *Scripsit* that lets you take advantage of the special functions, features, and print formats of your printer while your document is being printed," as the Powersoft ad puts it. Although designed specifically for Epson printers, it works with any printer that accepts CHR$ commands for control.

Scriplus permanently modifies the disk version of *Scripsit* to allow you to: send commands to the printer to activate special formats and functions; stop the printer so you can insert text, align forms, or change print-heads; optionally select line feed after carriage return; list alphabetically a disk directory from within *Scriplus* and fetch, chain or kill any file right from the display; and edit inserted text before resuming printing. *Scriplus* modifies all versions of *Scripsit* for Model I or III machines, allows you to use Model I *Scripsit* on a Model III, and works with all well-known Model I or III operating systems, including LDOS, DOSPLUS, NEWDOS, TRSDOS, and DoublDOS.

How Scriplus Works

The way *Scriplus* works is simplicity itself. You just use the control codes, without CHR$, in *Scripsit*. For instance, to print elongated characters, just put

```
27,14,
```

ahead of the words to be stretched. And if you want to go back to normal printing in the same text, just put

```
27,15,
```

in front of the part of the text to be printed normally. Characters that don't appear on the keyboard, such as brackets, can be printed out by using their ASCII equivalents in the control code lines. A question mark stops the printer so you can change printwheels, insert text, or position the paper for forms alignment. You can read the disk directory from within *Scriplus* by pressing BREAK and then typing a colon followed by the drive number.

These are only a few of the many features offered by *Scriplus*, which are described in rather small print, and not always written clearly enough for the uninitiated (but most beginners aren't ready for *Scriplus* anyway), in a little 14-page manual that often goes into detail, with a variety of examples.

AARDVARK — THE ADVENTURE PLACE

ADVENTURES FOR OSI, TRS-80, TRS-80 COLOR, SINCLAIR, PET, VIC-20

ADVENTURES — Adventures are a unique form of computer game. They let you spend 30 to 70 hours exploring and conquering a world you have never seen before. There is little or no luck in Adventuring. The rewards are for creative thinking, courage, and wise gambling — not fast reflexes.

In Adventuring, the computer speaks and listens to plain English. No prior knowledge of computers, special controls, or games is required so everyone enjoys them — even people who do not like computers.

Except for Quest, itself unique among Adventure games, Adventures are non-graphic. Adventures are more like a novel than a comic book or arcade game. It is like reading a particular exciting book where you are the main character.

All of the Adventures in this ad are in Basic. They are full featured, fully plotted adventures that will take a minimum of thirty hours (in several sittings) to play.

Adventuring requires 16k on Sinclair, TRS-80, and TRS-80 Color. They require 8k on OSI and 13k on VIC-20. Sinclair requires extended BASIC.

TREK ADVENTURE by Bob Retelle — This one takes place aboard a familiar starship and is a must for trekkies. The problem is a familiar one — The ship is in a "decaying orbit" (the Captain never could learn to park!) and the engines are out (You would think that in all those years, they would have learned to build some that didn't die once a week). Your options are to start the engine, save the ship, get off the ship, or die. Good Luck.

Authors note to players — I wrote this one with a concordance in hand. It is very accurate — and a lot of fun. It was nice to wander around the ship instead of watching it on T.V.

CIRCLE WORLD by Bob Anderson — The Alien culture has built a huge world in the shape of a ring circling their sun. They left behind some strange creatures and a lot of advanced technology. Unfortunately, the world is headed for destruction and it is your job to save it before it plunges into the sun!

Editors note to players — In keeping with the large scale of Circle World, the author wrote a very large adventure. It has a lot of rooms and a lot of objects in them. It is a very convoluted, very complex adventure. One of our largest. Not available on OSI.

HAUNTED HOUSE by Bob Anderson — This one is for the kids. The house has ghosts, goblins, vampires and treasures — and problems designed for the 8 to 13 year old. This is a real adventure and does require some thinking and problem solving — but only for kids.

Authors note to players — This one was fun to write. The vocabulary and characters were designed for younger players and lots of things happen when they give the computer commands. This one teaches logical thought, mapping skills, and creativity while keeping their interest.

DERELICT by Rodger Olsen and Bob Anderson — For Wealth and Glory, you have to ransack a thousand year old space ship. You'll have to learn to speak their language and operate the machinery they left behind. The hardest problem of all is to live through it.

Authors note to players — This adventure is the new winner in the "Toughest Adventure at Aardvark Sweepstakes". Our most difficult problem in writing the adventure was to keep it logical and realistic. There are no irrational traps and sudden senseless deaths in Derelict. This ship was designed to be perfectly safe for its' builders. It just happens to be deadly to alien invaders like you.

NUCLEAR SUB by Bob Retelle — You start at the bottom of the ocean in a wrecked Nuclear Sub. There is literally no way to go but up. Save the ship, raise her, or get out of her before she blows or start WWIII.

Editors note to players — This was actually plotted by Rodger Olsen, Bob Retelle, and someone you don't know — Three of the nastiest minds in adventure writing. It is devious, wicked, and kills you often. The TRS-80 Color version has nice sound and special effects.

EARTHQUAKE by Bob Anderson and Rodger Olsen — A second kids adventure. You are trapped in a shopping center during an earthquake. There is a way out, but you need help. To save yourself, you have to be a hero and save others first.

Authors note to players — This one feels good. Not only is it designed for the younger set (see note on Haunted House), but it also plays nicely. Instead of killing, you have to save lives to win this one. The player must help others first if he/she is to survive — I like that.

PYRAMID by Rodger Olsen — This is one of our toughest Adventures. Average time through the Pyramid is 50 to 70 hours. The old boys who built this Pyramid did not mean for it to be ransacked by people like you.

Authors note to players — This is a very entertaining and very tough adventure. I left clues everywhere but came up with some ingenous problems. This one has captivated people so much that I get calls daily from as far away as New Zealand and France from bleary eyed people who are stuck in the Pyramid and desperate for more clues.

QUEST by Bob Retelle and Rodger Olsen — THIS IS DIFFERENT FROM ALL THE OTHER GAMES OF ADVENTURE!!!! It is played on a computer generated map of Alesia. You lead a small band of adventurers on a mission to conquer the Citadel of Moorlock. You have to build an army and then arm and feed them by combat, bargaining, exploration of ruins and temples, and outright banditry. The game takes 2 to 5 hours to play and is different each time. The TRS-80 Color version has nice visual effects and sound. Not available on OSI. This is the most popular game we have ever published.

MARS by Rodger Olsen — Your ship crashed on the Red Planet and you have to get home. You will have to explore a Martian city, repair your ship and deal with possibly hostile aliens to get home again.

Authors note to players — This is highly recommended as a first adventure. It is in no way simple — playing time normally runs from 30 to 50 hours — but it is constructed in a more "open" manner to let you try out adventuring and get used to the game before you hit the really tough problems.

ADVENTURE WRITING/DEATHSHIP by Rodger Olsen — This is a data sheet showing how we do it. It is about 14 pages of detailed instructions how to write your own adventures. It contains the entire text of Deathship. Data sheet - $3.95. NOTE: Owners of OSI, TRS-80, TRS-80 Color, and Vic 20 computers can also get Deathship on tape for an additional $5.00.

PRICE AND AVAILABILITY:

All adventures are $14.95 on tape except Earthquake and Haunted House which are $9.95. Disk versions are available on OSI and TRS-80 Color for $2.00 additional.

Please specify system on all orders

ALSO FROM AARDVARK — This is only a partial list of what we carry. We have a lot of other games (particularly for the TRS-80 Color and OSI), business programs, blank tapes and disks and hardware. Send $1.00 for our complete catalog.

AARDVARK - 80
2352 S. Commerce, Walled Lake, MI 48088
(313) 669-3110

Phone Orders Accepted 8:00 a.m. to 4:00 p.m. EST. Mon.-Fri.

TRS-80 COLOR **SINCLAIR** **OSI** **VIC-20**

CIRCLE 101 ON READER SERVICE CARD

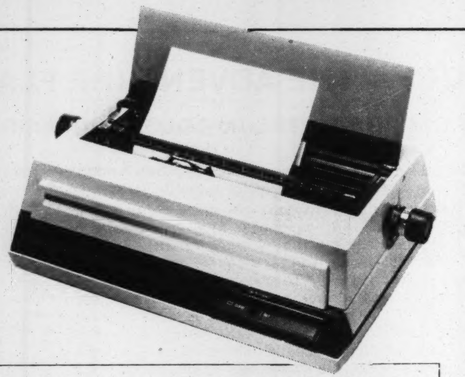
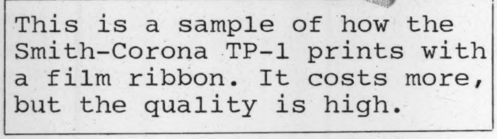


Figure 4. Smith-Corona's TP-1 is the first daisywheel printer to sell for under $900; slower speed is the secret.



This is a sample of how the Smith-Corona TP-1 prints with a film ribbon. It costs more, but the quality is high.

Figure 5. Smith-Corona's one-time film ribbon provides letter-quality printing on the TP-1 daisywheel printer.

Daisywheel Printers

The most expensive printer offered by Radio Shack in catalog RSC-7 is the $1960 Daisywheel II, which at 43 characters per second prints slower than the two top dot-matrix printers: Line Printer V (160 cps) or VI (100 cps). But it is a "letter-quality" printer, used for important documents. It is slower because a daisywheel has to spin around to the next character, which takes longer than pushing a couple of dot-matrix pins a short distance out from a printhead.

Even at 43 cps, a daisywheel printer requires rather precise mechanisms. But if you slow it down, you can use less precise—and therefore less expensive—mechanisms, and that's just what Smith-Corona has done.

Smith-Corona's TP-1 Daisywheel

You may have noticed ads in these pages for a low-cost daisywheel printer. Smith-Corona advertises the TP-1 (Figure 4) for "under $900"; the suggested list price is $895. A dealer can sell it at any price he chooses; some offer the TP-1 at $895, while others sell it for less. Micro-Printer Marketing (MPM), which also advertises in these pages, sells the TP-1 for $845. (Yes, they did advertise it at first for $799, but that was a mistake; "crossed wires," they said.)

The TP-1 prints 12 characters per second, and does it beautifully (Figure 5). If you are not in a hurry, you may find this daisywheel printer is just right. You can get it in two models, like most typewriters: 10 characters per inch (six different printwheels are available); and 12 characters per inch (five printwheels). MPM sells the printwheels at $4.95 each.

Smith-Corona makes three ribbon cassettes that snap in and out very quickly. MPM offers Smith-Corona's "one-time film" ribbon, for the highest quality of print, at $2.95; it's good for about 57,000 characters (Figure 5). For $3.45, MPM sells the nylon-fabric ribbon, which provides good but not top-quality printing, for about 250,000 characters. That's about 5.18 cents per thousand high-quality characters, and 1.38 cents per thousand low-cost characters. Smith-Corona also has a "multi-strike Mylar" ribbon, not offered by MPM, which overlaps characters on the ribbon, for a somewhat lower quality of printing than with one-time film, and for about 240,000 characters.

In addition to the slower speed, another factor that keeps down the price of the TP-1 is the print mechanism, which is the same as on the Smith-Corona electronic typewriters—the Typetronic office model and Ultrasonic portable—and thus didn't require any expensive R&D time. Also, there's no end-of-paper switch, such as you'll find on the Line Printer VIII. If you want to print on cut sheets of paper rather than use continuous forms, you must do something to defeat the end-of-paper switch, such as back up the cut sheets with a long piece of continuous-form paper, to keep that switch from operating. This is no problem with the TP-l.

To use the TP-l with *Scripsit*, you need to know that the TP-l, when it receives a carriage-return (CR) signal, does a CR and a line feed (LF). But it will not space up the paper if it receives a LF preceded by a CR. Thus, to double-space, the TP-1 must receive a CR+LF, then a LF.

To help keep down the cost, the TP-l has only a couple of software-controlled printing features: boldface (by back-spacing and printing each letter a second time); setting margins and tabs; and underscoring.

The TP-1's character set provides 128 ASCII characters, 88 of them printable, but no less-than or greater-than signs. A top-of-form switch is provided, as are serial and parallel interfaces.

The TP-l manual is a model of simplicity, and can be read and understood by almost any teenager, except perhaps for a couple of semi-technical pages at the end.

Three From Acorn

Let's take a look at three programs for the TRS-80 Models I and III from Acorn Software Products, Inc. (634 N. Carolina Ave., S.E., Washington, DC 20003). They are available at your local computer store or, with an additional $2 for shipping and handling, from Acorn. First, two games, *Astroball* ($19.95 on 16K tape or disk) and *Lost Colony* ($29.95 on 16K tape or 32K disk); then an expense-monitor, *Money Manager* ($39.95 on 32K (minimum) disk).

Astroball

Astroball is a space-age pinball game, with many underlying features in common with Acorn's *Pinball*, but with many more moving targets. The ball speed is faster, and Acorn claims the game "on the fastest of the five skill levels, is quite difficult to control."

To start, you hold down the spacebar. The ball moves up and down in the lowest inch of the ball-chute, at the bottom right of the display (Figure 6). If you release the spacebar when the ball is at the top, it will move slowly into the game area. But if you release the spacebar when the ball is at the bottom, the ball moves faster, just like an arcade game, where the further back you pull the plunger, the faster the ball goes. You get five balls per game.

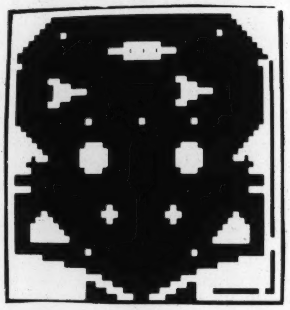


Figure 6. Astroball display, showing the ball-chute along the right edge, a pair of flippers at the bottom, and 18 targets.

The up-arrow and right-arrow control flippers at the bottom of the game area. You press the arrow keys to flip the ball back into the game, but there is just enough room between the flippers, of course, for the ball to drop between them and end its play.

As the ball flies around the screen, it scores points by hitting various objects, such as Space Ships, Flying Saucers, Asteroids, Meteors, and Pulsars. Two of the objects are Black Holes; hit one of them and the ball may disappear if the nearby Pulsar is not lit and therefore hasn't enough gravitational pull to yank the ball back out of the Black Hole. There

METATEXT!

from Metaresearch, Inc.

More software for your hard dollar.

Completely Hardware-Free

APPLE II

TEXT PROCESSING

METATEXT DISC and
40-page Manual ..... *Only* **$79⁰⁰**

- Pure-software serial printer output
- Full ASCII 80-character CRT
- Ability to mix alphanumerics/graphics
- Text editor - similar to UNIX™ 'ED'
- Documentation & demonstration programs

ORDER FROM YOUR DEALER OR DIRECTLY FROM METARESEARCH, INC.

Metaresearch, Inc.

1100 S.E. Woodward St.
Portland, Oregon 97202
(503) 232-1712

Add $1.50 Shipping

CIRCLE 207 ON READER SERVICE CARD

NEW! For the Apple 48K . . .

PSYCHOLOGICAL DIARY

Including . . .

- Diary Keeper
- Dream Interpreter
- Personality/Relationship Testing
- Super-sophisticated ELIZA, programmed by psychotherapists using techniques from contemporary therapeutic schools
- Diary locked by user-supplied password
- Diary Search feature for user indexing
- Diary entries saved on disk, printed on printer
- Machine language for fast running
- For personal growth and self-exploration only; not a substitue for professional psychotherapy

$39.95 *Ohio residents add $2.60 sales tax*

PSYCHOLOGICAL SYSTEMS
1519 Burlington Road - Cleveland Heights, OH 44118

CIRCLE 255 ON READER SERVICE CARD

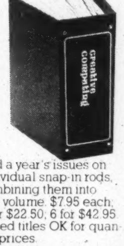
SHELF CONSCIOUS?

Now you can organize your copies of

CREATIVE COMPUTING

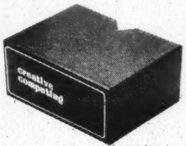
Now your magazines can be a handsome addition to your decor, well organized, and easy to find, thanks to these durable library-quality cases or binders. They're made of luxury-look leatherette over high-quality binder board. And both styles are custom-designed for this or any other magazine you save, with size, color and imprint selected by the publisher. FREE transfer foil included for marking dates and volumes.

Magazine binders



hold a year's issues on individual snap-in rods, combining them into one volume. $7.95 each; 3 for $22.50; 6 for $42.95. Mixed titles OK for quantity prices.

Open-back cases



store your issues for individual reference. $6.95 each; 3 for $19.75; 6 for $37.50. Mixed titles OK for quantity prices

For faster service, **CALL TOLL-FREE 24 HOURS: 800-345-8112.** (In PA only: 800-662-2444.)

Creative Computing
P.O. Box 5120 Philadelphia, PA 19141

Please send: ☐ Cases ☐ Binders

TITLE	QUANTITY
Creative Computing	________
Other: ______________	________

☐ PAYMENT ENCLOSED $__________.* Add $1.00 *per order* for postage and handling. Outside USA add $2.50 *per unit* ordered; send US funds only.

☐ CHARGE (Minimum $10):
  ☐ American Express ☐ MasterCard
  ☐ Visa

Card No.______________Exp. Date________

Signature________________________

Print Name________________________

Address________________________

City________________________

State/Zip________________________

*Residents of PA add 6% sales tax.

Get MORE out of VISICALC With

V-UTILITY

$99.95

COPYRIGHT © 1981 YUCAIPA SOFTWARE Version 5.0

SPECIFY COMPUTER MODEL

NOW AVAILABLE FOR

IBM PERSONAL COMPUTER (PC DOS)
APPLE II (DOS 3.2 and DOS 3.3)
TRS-80 MOD I, II, III and 16 (TRSDOS)

V-UTILITY CONSISTS OF ALL THESE VISICALC "USER FRIENDLY" UTILITY PROGRAMS ON ONE DISK RUN BY INDEX AND PROMPTS.

V-PRINT SELECT FROM 1 TO 16 COLUMNS AND PRINT THEM IN ANY ORDER. YOU MAY SPECIFY THE PRINT WIDTH OF EACH OF THE COLUMNS INDIVIDUALLY AND ALLOCATE FROM 0 TO 6 SPACES BETWEEN THE COLUMNS. A FANTASTIC UTILITY PROGRAM.

V-STAT PROGRAM COLLECTS DATA AUTOMATICALLY FROM THE VISICALC COLUMN AND CALCULATES NUMERICAL DISTRIBUTION, CORRELATION COEFFICIENT, REGRESSION ANALYSIS, CHI² TEST, AND T-TEST. YOU MAY SELECT THE COLUMNS FOR DATA ENTRY AND SPECIFY THE ROW# TO START AND ROW TO END DATA COLLECTION. PROGRAM IS EASY TO RUN.

V-PLOT THIS PROGRAM AUTOMATICALLY INPUTS DATA FROM A VISICALC COLUMN, PERFORMS AUTO SCALING THEN PLOTS EITHER 1 OR 2 COLUMNS ON A REGULAR LINE PRINTER (GRAPHICS NOT REQUIRED). IDEAL FOR ANALYZING UP TO 250 NUMERICAL DATA POINTS IN RELATION TO TIME.

V-OVERLAY PROVIDES THE FOLLOWING SELECTION OF OVERLAYS TO LOAD ON TO THE VISICALC SHEET.- MOVING AVERAGES, EXPOTENTIAL SMOOTHING EQUATIONS, TIME SERIES TREND ANALYSIS, DATE COLUMNS.

YUCAIPA SOFTWARE

12343 12TH ST · YUCAIPA·CA·92399
PHONE (714) 797-6331

SHIPPING & COD $3.00

IBM, APPLE, TRS-80, and VISICALC are trademarks respectively of International Business Machines Corp, Apple Computer Inc, Tandy Corp, and VisiCorp

CIRCLE 318 ON READER SERVICE CARD

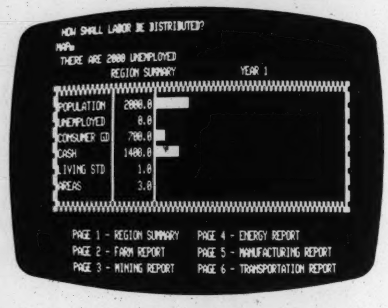
are some special scoring features, such as earning an extra ball if you manage to explode any five of the seven Meteors with one ball.

Sound effects are included: you get a plunk-plunk sound as the ball bounces around the game area, and various witchoo-witchoo, wowee and beeoop sounds as the ball hits targets. The little eight-page manual says "a good player should score about 30,000" points. Well, I didn't get near that, but the game is addicting enough that I didn't want to try for the 30,000, or for the 80,000 an excellent player is supposed to be able to score, because I could get hooked, and there were two more Acorn programs to check out. One of the hooks of this game is that a fair amount of luck is involved, because the path of the ball is beyond your control—and depends only on how far back you pulled the "plunger"— until it gets within range of the flippers. You keep telling yourself luck will be entirely on your side in the *next* game, and luck, combined with your ever-increasing skill as you play more and more, will give you a much higher score than ever before.

Lost Colony

The Acorn ads describe the game thusly: "You are the Economic Manager of the world's first space colony. The next support ship from Earth isn't due for another 15 years and you have instructions either to make things go better or get out of office in shame. You must assure the survival of this struggling space colony—it's all up to you. You'll be presented with the human, natural and industrial resources of the planet. You must allocate labor, explore new territories, decide on production quotas, determine pay scales and taxes for the most productivity—you're armed with maps and charts. 10 levels of difficulty."

The 23-page booklet goes into a great amount of detail, and the first page notes this is "a complex simulation. It is suggested that you read this documentation carefully before attempting serious play." As you play, you are presented with chart reports involving five industries: farm, minerals, energy, manufacturing, and transportation. You decide who works where, what is manufactured, how many factories are built, what the standard of living is, how much capital equipment, distribution of consumer goods, what is stockpiled, what tax rates are changed, when to explore new territories, how to settle new territories, etc. You get a year-end report when you have done everything, and then you can begin a new year, in which you try to do better. But if the standard of living isn't up to the workers' expectations, they will strike or throw you out of office. How's that for a challenge?



```
HOW SHALL LABOR BE DISTRIBUTED?
MAP=
THERE ARE 2000 UNEMPLOYED
          REGION SUMMARY            YEAR 1

POPULATION   2000.0
UNEMPLOYED      0.0
CONSUMER GD   700.0
CASH         1400.0
LIVING STD      1.0
AREAS           3.0

   PAGE 1 - REGION SUMMARY   PAGE 4 - ENERGY REPORT
   PAGE 2 - FARM REPORT      PAGE 5 - MANUFACTURING REPORT
   PAGE 3 - MINING REPORT    PAGE 6 - TRANSPORTATION REPORT
```

Figure 7. One of the reports generated by Lost Colony, with a bar graph showing several of the resources.

The game is almost entirely based on displayed reports (Figure 7) which show, in numbers and bar graphs, how you have allocated resources. The manual provides minute detail on how to play the game, and also provides a couple of pages of hints, such as "Explore the continent and settle only the lush new areas," "Plan on growing more food than you need," and "Watch the bar graphs in the various reports to get an idea of how developments in one industry affect the others."

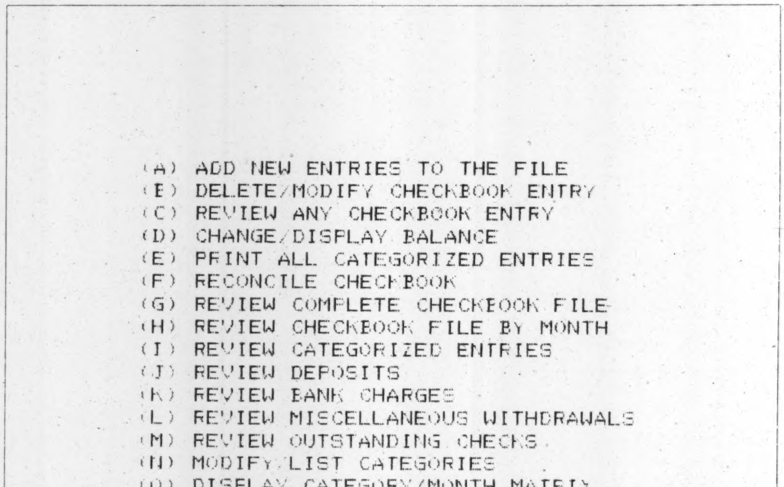
If you are into resource management simulation, the space age features of *Lost Colony* can be quite intriguing; similar simulations may well be in actual use 100 years from now, or whenever space colonies become practical. The game isn't all reports; there is a small, fascinating map of the continent on "Warren's World," the name bestowed by author David Feitelberg on the colonized small planet, which he may have named after Jim Warren, one of the personal computer pioneers. The map is divided into 45 areas; at any stage of the game you can call up the map and ask for a display of either the settled areas or the resource (raw materials) sites.

Money Manager

This is a menu-driven personal finance management program that allows you to define your own categories of expense (up to 99 of them) and has a built-in category for tax-deductible items. *Money Manager* permits storing data in as many as 100 checkbook entries per month (250 with a 48K system, but you will need more than one disk drive; each check-writing year has its own diskette). Automatic withdrawals can be specified, and lump payments (such as often occur with credit cards) can be broken down into several categories. The program was developed for output to an 80-column lineprinter, and allows formatted printouts by category and time period. (If you use a printer with less than 80 columns, you must change printer formatting in the program.)

If you are using a TRS-80 Model III, you must use the Convert utility to make this Model I disk compatible with your machine. Then with a RUN"MONEY" the checkbook program loads into memory and executes. When you press ENTER,

Figure 8. These 15 options are displayed in the program menu for Money Manager.



```
(A) ADD NEW ENTRIES TO THE FILE
(B) DELETE/MODIFY CHECKBOOK ENTRY
(C) REVIEW ANY CHECKBOOK ENTRY
(D) CHANGE/DISPLAY BALANCE
(E) PRINT ALL CATEGORIZED ENTRIES
(F) RECONCILE CHECKBOOK
(G) REVIEW COMPLETE CHECKBOOK FILE
(H) REVIEW CHECKBOOK FILE BY MONTH
(I) REVIEW CATEGORIZED ENTRIES
(J) REVIEW DEPOSITS
(K) REVIEW BANK CHARGES
(L) REVIEW MISCELLANEOUS WITHDRAWALS
(M) REVIEW OUTSTANDING CHECKS
(N) MODIFY/LIST CATEGORIES
(O) DISPLAY CATEGORY/MONTH MATRIX
```

SOFTWARE HUT

APPLE SOFTWARE

NOW OVER 90 COMPANIES INCLUDING A HARDWARE SECTION ALL FOR THE APPLE COMPUTER.

COMBINE THIS WITH OUR GREAT PRICES AND FREE SHIPPING ON ORDERS OVER $100.00 PLUS OUR NEW SPECIAL OF A VINYL DISC JACKET FOR EVERY 2 PROGRAMS AND YOU HAVE A PERFECT PLACE TO BUY APPLE PRODUCTS.

ALSO WE NOW CARRY
ATARI AND IBM P.C. PRODUCTS

CALL OR WRITE FOR OUR CATALOG:

We Accept:
Personal or cashiers check
Money Order or
Visa, MasterCard
PA Residents add 6% tax

SOFTWARE HUT, INC.
2653 S. 8th STREET
PHILA., PA. 19148
(215) 462-2268

CIRCLE 281 ON READER SERVICE CARD

3D Graphics

from **Metaresearch, Inc.**

More software for your hard dollar.

'3DRB' Disc for **APPLE II** **$59.00**

- Arbitrary 3-Dimensional Hi-Res Rotations
- Full ASCII Graph Labeling for Hi-Res
- Stereo Red/Blue 3-D Animation Games, Experiments

'VGR.1' Cassette for **VIC-20** **$29.00**

- Full Screen 44x48 Color Graphics
- Capability for putting English Labels on Graphs
- Stereo Red/Blue 3-D Experimenter's Programs

BOTH PACKAGES COME WITH MANUAL, BEGINNER'S PRIMER AND A PAIR OF RED/BLUE STEREOSCOPIC GLASSES

Metaresearch, Inc.
1100 S.E. Woodward St.
Portland, Oregon 97202
(503) 232-1712

MasterCard VISA
Add $1.50 Shipping

CIRCLE 206 ON READER SERVICE CARD

Introducing the SERIES 900 **MARKET MAVERICK**

A new stock market program from FSI for the serious investor

Used with the Apple II,* the Series 900 "Market Maverick" provides immediate investment counsel and is not just another device that raises more questions than it answers. Utilizing shorter forecast time horizons, Series 900 has a long history of excellent performance even under extreme market conditions. With fewer inputs, it is user friendly—yet it answers questions asked from many angles and points of view. Series 900 "Market Maverick" is not a game. It is not theoretical. It is for the serious investor or stock broker. Send for yours today. ***Requires 48K Apple II/II Plus, DOS 3.3 and Applesoft in ROM or 16K RAM expansion.***

Save $30...Limited Time Offer. If you order now, we will ship your Series 900 "Market Maverick" for just $145.00—and that's $30.00 off the regular price! MasterCard/Visa welcome, as are dealer inquiries.

* Over 10 years of excellent performance
* Stock data provided for immediate use on over 900 stocks
* Logic is based on precisely-read variables
* Fantastic results in up or down markets

SAVE $30 **FREE BROCHURE**

☐ Please send me the Series 900 Market Maverick for just $145.00. (Ohio residents add 5% sales tax)

☐ Please send me the free brochure which contains additional specific information on the "Market Maverick."

Paid by: ☐ Check to Financial Software, Inc.
☐ MasterCard ☐ Visa
Card#__________ Exp.________

Name ____________________
Address ____________________
City __________ State ______ Zip ______

FINANCIAL SOFTWARE, INC.
11401 Westridge Circle, Chardon, OH 44024 / (216) 338-6811

INTRODUCTORY **PRICE** **$145.00** **SAVE $30**

*Apple II is a registered trademark of Apple Computer, Inc.

the first menu (Figure 8) is displayed.

Although option A may seem the first to call up, you must first assign a list of categories, using option N. "The ability to establish categories reflecting your own needs and goals is one of the features that makes *Money Manager* so valuable," says the 18-page manual, adding "We can't decide how much you should spend on what—this isn't a budget-making program—but once you have decided, you can use the categories to monitor how well you are doing. The printing capability makes it possible to know where your money is going as well as whether a category needs breaking down further or eliminating."

The manual notes that perhaps you don't want to begin by making out a budget. No problem; just plan and enter your categories, and the program will let you monitor your expenditures. "If you want to use your actual living expenditures as a basis for planning later, you'll find yourself in possession of much valuable information about your lifestyle."

So first you assign categories. The program reserves the first category for tax-deductible items, but from then on, you're on your own, and can add or delete categories, or change their names, or display or print them. So you set up categories for rent, phone, utilities, entertainment, transportation, etc.

Then you get into option A, adding new entries. This is where the bulk of the work is, adding newly written checkbook entries and deposits to the file. The first time around, the program asks how many disk drives you are using, what the check-writing year number is, and what your checkbook balance is. The manual notes that "The maximum balance allowed in the TRS-80 version is $999,999.99," which may be a little low for some readers, but which should be adequate for the majority.

You enter the check number, date, description, amount, category, and whether the item is tax-deductible. Then you get a new balance display, and the program asks if the information is correct and if you have any more entries.

Other options permit you to delete or modify a checkbook entry, review any checkbook entry, display or change the balance, print all categorized entries, and so on down the line of over a dozen options.

In option F, for balancing your checkbook, all outstanding checks are displayed. You indicate the cancelled checks, and if the program-generated balance matches the balance printed on your bank statement, you can enter the cancelled checks into the file. If it doesn't, you go back to the main menu to start looking for the error.

If you are willing to spend the time entering all your expenditures and deposits into *Money Manager*, you may be quite surprised to find out where your money is really going. And then, even if you are not on a budget, you may decide to spend a little less here, or a little more there. At this point in the economy, can you afford *not* to know where your money is going?

Short Program #33: Guessing Game

Can you predict what sort of pattern this graphics program will generate?

```
100 CLS
110 X=RND(45)
120 Y=RND(X)
130 SET(X,Y)
140 GOTO 110
```

The answer is very simple, but you may have to RUN the program first, and then figure out why the pattern looks the way it does. Add

```
135 RESET(X+1,Y+1)
```

to turn it into a constantly-changing pattern. ☐

COLOR COMPUTER

TRS-80

CHRISTMAS SPECIAL

10% discount on any 3 games or order over $50.

MEMORY EXPANSION

- EXTEND MEMORY FROM 16K to 32K
- 100% Compatible With Extended Basic
- No Soldering Or Modification
- Fits Inside Computer
- $79.95

16K MACHINE LANGUAGE GAMES

- GHOST GOBBLER $21.95
- DEFENSE $21.95
  For Missile Command enthusiasts.
- SPACE WAR $21.95
- GALAX ATTAX $21.95
- STAR FIRE $21.95
  Like the arcade version of DEFENDER.
- CROID $12.95
  Carry on an intelligent conversation with the computer with this version of the ELIZA artificial intelligence program.
- CC THELLO $14.95
  Super arcade quality OTHELLO game.
- KEYS OF THE WIZARD $19.95
  Best new adventure game! Over 200 rooms filled with creatures, tricks, treasures and magic spells. Cassette save feature built-in.
- COLOR OUT $9.95
  Like Breakout, you must knock out six layers of blocks using your paddle to prevent missiles from escaping. Joysticks optional.

WE HAVE:

- ★ SUPER BASIC GAMES
  - CC POKER
  - LASER COMMAND
  - GAME PAKS
  - ALCATRAZ II
  - SUB HUNT
  - BATTLE FLEET
  - PIRATE AHOY
- ★ COLOR TEXT STAR WORD PROCESSOR
- ★ BOOKS
- ★ GEOGRAPHY PAK

SUPERCHARGER - Allow machine language access to all 64K RAM in a Series E PC board. No hardware mods. $39.95

DISK BASED EDITOR/ASSEMBLER - MACROS, CONDITIONAL ASSEMBLY - will work with Supercharger. $49.95

FLEXPLUS DOS

FLEXPLUS is a powerful, easy-to-use disk operating system. Spectral Associates has adapted TSC's FLEX to the best DOS completely compatible with Radio Shack software for use on the Color Computer. Eliminate the need for Radio Shack's TRS DOS - use **FLEXPLUS** with Editor/Assembler and have the options of a full range of utilities. **FLEXPLUS** works on the 32K Radio Shack disk system with 64K memory chips with a High Resolution multi-screen format that supports a 24 line by 51 character display! Also included are special enhancements to Radio Shack's Disk system when you are running FLEX with single or double sided, single or double density, 35, 40 and 80 track drives.

Advantages of FLEXPLUS are:

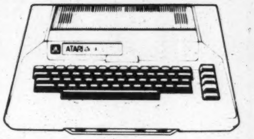
- Best price anywhere
- Easy start-up — just type "RUN FLEX+"
- Allows you to save RS compatible disk files from **FLEXPLUS**
- All FLEX compatible software will run including INTERRUPT DRIVEN SOFTWARE
- NO HARDWARE MODIFICATIONS NEEDED
- Warranty will not be voided — no need to open computer
- Wide range of available software
- Requires Supercharger board
- $149.95 for **FLEXPLUS**, Editor/Assembler and Supercharger

SPECTRAL ASSOCIATES
143 HARVARD AVE.
Tacoma, Washington 98466
WRITE FOR COMPLETE CATALOG
ADD 3% FOR SHIPPING $1.00 minimum
Allow 2-3 wks. for delivery
(206) 565-8483
VISA OR MASTERCARD ACCEPTED

TOLL FREE ORDERS ONLY
800-426-1830
EXCEPT WA, HI, AK

CIRCLE 286 ON READER SERVICE CARD

ATARI ™



800 16K	**$639**
800 48K (with mosaic 32K board)	**$738**
800 48K (with ATARI memory)	**$789**
400 16K	**$269**
410 Recorder	$ 75
810 Disk Drive	$439
825 Printer	$579
830 Modem	$155
850 Interface	$169
481 Entertainer	$ 79
482 Educator	$119
483 Programmer	$ 55
484 Communicator	$299
853 16K Ram	$ 79

ATARI Software

CX4104 Mailing List	$ 19
CX404 Word Processor	$115
CXL4007 Music Composer	$ 45
Programming 2 & 3	$ 22
Conversational Languages	$ 45
CX4018 Pilot	$ 59
CX405 Pilot	$ 99
CXL4003 Assembler Editor	$ 45
CX8126 Microsoft Basic	$ 67
CXL4022 Pac-Man	$ 33
CX8130 Caverns of Mars	$ 29
CXL4020 Centipede	$ 33
CXL4006 Super Breakout	$ 28
CXL4008 Space Invaders	$ 28
CXL4009 Computer Chess	$ 28
CXL4011 Star Raiders	$ 35
CXL4012 Missile Command	$ 28
CXL4013 Asteroids	$ 28

New Software for Atari

Ulysses & Golden Fleece	$24
Space Eggs	$21
Cyclod	$21
Snake Byte	$21
Ultima I	$28
Ultima II	$42
Krazy Kritters	$35
K-Star Patrol	$35
K-razy Antiks	$35
Slime	$21
Nautilus	$21
Shamus	$21
David's Midnight Magic	$24
Track Attack	$21
Star Blazer	$21
Hi-res Adv.—Deadly Secrets	$24
Curse of Ra	$15
Dragon's Eye	$21
Battle of Shiloh	$28
Tigers in the Snow	$28
Doctor Goodcode's Cavern	$21
Frogger	$24
Bishops Square	$21
Graphics Master	$28
Preppie	$18
Rear Guard	$18
Bug Attack	$21
Pathfinder	$24
Deadline	$36
Zork I	$28
Zork II	$28
Gorf	$28
Wizard of Wor	$28
Battle Trek	$28
Canyon Climber	$21
Shooting Arcade	$21
Pacific Coast Highway	$21
Clowns and Balloons	$21

For Fast Delivery, send certified or cashier checks, money orders, or direct bank wire transfers. Personal checks allow 2 to 3 weeks to clear. Prices reflect a cash discount only and are subject to change. Shipping—Software ($2.00 Minimum). Hardware—call. Foreign inquiries invited — add 15% for shipping. Nevada residents add sales tax.

TOP SELLERS
Atari

Entertainment

Temple of Apshai	$28
Raster Blaster	$21
Apple Panic	$21
Crossfire	$21
Threshold	$28
Mousekattack	$24
Krazy Shootout	$35
Deadline	$36
Tumble Bugs	$21
Pool 1.5	$24
Crypts of Terror	$24
Ricochet	$15
Empire of the Overmind	$24
Tanktics	$21
Match Racers	$21
Wiz & Princess	$22
Mission: Asteroid	$18
Ali Baba & the Forty Thieves	$22
The Shattered Alliance	$28

Business & Utilities

Visicalc	$179
Mail Merge	$ 21
Data Perfect	$ 79
Letter Perfect	$105
Text Wizard	$ 69
Datasm 65 2.0	$105
Micropainter	$ 26
The Basic Compiler	$ 69
Color Print	$ 29
File Manager 800	$ 69

Programming Techniques

Display Lists	$ 17
Horiz/Vert Scroll	$ 17
Page Flipping	$ 17
Basics of Animation	$ 17
Player Missile Graphics	$ 24
Sound	$ 17
Data Files	$ 24

COMPUTER OUTLET

*** SPECIALS OF THE MONTH ***

ELEPHANT DISKS (BOX)	**$ 22**
HAYES SMARTMODEM	**$229**
FRIENDLY TERMINAL SOFTWARE PACKAGE (ATARI)	**$ 39**
MOSAIC 32K RAM	**$ 99**
RAMDISK (128K)	**$429**
AMDEK COLOR I MONITOR	**$329**
PERCOM DOUBLE DENSITY DRIVE	**$679**
NEC 8023A PRINTER	**$479**
K-DOS	**$ 65**
OS/A +	**$ 59**
BASIC A +	**$ 59**
FLIP N' SORT DISKETTE BOX (Holds 50 Diskettes)	**$ 21**
FLIP-SORT CARTRIDGE BOX (Holds 10 Atari Computer Cartridges)	**$ 21**
AXIOM GP-100 GRAPHICS PRINTER	**$299**
AXIOM IMP-4 GRAPHICS PRINTER	**$499**

YOUR ONE STOP MARKETPLACE FOR ALL YOUR COMPUTER NEEDS

Computer Outlet

Park Place — Upper Level
1095 E. Twain — (702) 796-0296
Las Vegas, Nevada 89109

Call Toll Free **800-634-6766**
We accept Major Credit Cards
Mon.-Fri. 8 A.M.-6 P.M.
Sat. 9 A.M.-5 P.M.

CIRCLE 316 ON READER SERVICE CARD

APPLE SPECIALS

Bez-Wars	$ 19
Bez-Man	$ 15
Baseball	$ 20
Peeping Tom	$ 23
Fly Wars	$ 20
Kabul Spy	$ 23
The Gauntlet	$ 24
Sherwood Forest	$ 23
The Queen of Phobos	$ 23

Entertainment

Zero Gravity Pinball	$20
Amoeba Man	$24
Marauder	$24
Knight of Diamonds	$24
Cytron Masters	$27
Star Blazer	$22
Swashbuckler	$23
Twerps	$20
Minotaur	$23
Lemmings	$20
Bandits	$23
Dueling Digits	$20
Cyclod	$20
Frogger	$23
Choplifter	$23
Serpentine	$23
David's Midnight Magic	$23
Escape (A2-SG1)	$22
Congo	$23
Goldrush	$23
Pig Pen	$20
Tunnel Terror	$20
Threshold	$27
Time Zone	$65
Ulysses & The Golden Fleece	$23
Gorgon	$27
Ceiling Zero	$20
Raster Blaster	$20

Business

Screenwriter II	$ 89
Visicalc 3.3	$179
The Word Handler	$129
Magic Window	$ 65
Magic Mailer	$ 45
Magic Words	$ 45
Real Estate Analyzer II	$125
Supercalc	$185
PFS: Report (New)	$ 65
The General Manager	$ 97
D.B. Master	$159
Pascal Programmer	$ 89
Pie Writer	$ 95
Wordstar	$219
Datafax	$129
Datalink	$ 65
The Home Accountant	$ 52

Peripherals

Micromodem II	$ 269
Novation Apple-Cat II Modem	$ 319
The Joyport	$ 53
The Grappler Plus	$ 129
Game Paddles	$ 28
Ramplus-32K	$ 159
Card Reader	$1219
The Clock	$ 229
Rana Elite One Disk Drive	$ 359
System Saver	$ 65
NEC 3510 Printer	$1699
NEC 12" Green Screen Monitor	$ 169
Microline 84 Printer	$1089
Amdek Color II Monitor	$ 759
Versa Writer Graphics Tablet	$ 239
Ramcard	$ 139
Softcard	$ 269

The Computer Outlet is an associate of The Computer Learning Center For Children. We are experts in educational technology and can customize educational software curriculums for school districts, individual schools, or for the child at home. Please contact us about your software and equipment requirements and feel free to stop by our school in Las Vegas.

We have one of the world's largest educational software inventories featuring our own Computer Learning Center software.

Ten Little Robots (ATARI)	$12.95
Pre-School Math (ATARI)	$19.95

we are
commodore VIC
experts!!

- We sell and service only VIC-20 Computers!
- We have more in stock merchandise than anyone!
- We give the best service in the USA!
- One day delivery express mail!
- We handle warranty and service within 24 hours!
- We give 15 day free trial on all merchandise!
- We mail refunds within 24 hours after receiving returns!
- We have over 400 programs — 270 educational tapes programming aids — business — home — games!
- We mail free catalogs — specify category you desire!
- We accept Visa and Mastercard — plus we ship C.O.D.!
- We are the first to offer new "in stock" items!

"BUY YOUR VIC-20'S CHRISTMAS PRESENT NOW!"

1. PE 2003 UP TO 60K EXPANSION MODULE Six sloles — add up to 6 cartridges—daisy chain additional modules for expansion beyond 60K! Switch select any program, start and stop programs with reset button. Not necessary to remove cartridges or turn off computer! (One year warranty)
List $149.00 — Sale Price $109.00.

2. PE 2004 COM-STAR LINE PRINTER Full size, traction and friction feed, deluxe quality, 40, 66, 80, 132 columns, prints 8½" x 11" letter size, single or fan fold paper, labels and etc. Includes specially designed cable that plugs direct into the VIC-20 printer port—no other interface needed!
List $549.00 — Sale Price $399.00.

WE LOVE OUR CUSTOMERS
(our prices prove it)

PROTECTO
ENTERPRIZES (FACTORY-DIRECT)
BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

CIRCLE 254 ON READER SERVICE CARD

iews...book r

Steve Gray, et al.

Silent Witness, by Ed Yourdon. Yourdon Press, New York, NY. 177 pages hardcover, $12.95.

Your wife is a hypochondriac and a terrible nag. She has just entered the hospital (again) for a series of tests. The doctor confides to you that there is really nothing wrong except that she wants some attention. He also informs you that he would like an advance payment against his bill. You write out a check on the spot but realize that when you receive the hospital bill it will drive you into personal bankruptcy. In utter despair you begin wandering the streets of New York during one of the worst blizzards ever to hit the city. During your wandering you stumble upon a scene that has all the earmarks of a gangland execution. Near one of four bodies you spot a suitcase and decide to look inside. Lo and behold, $3 million!

After some soul searching, you decide to erase your old identity and establish a new one. Erase is the operative word. For while it is easy enough to change your physical appearance, your big job is to erase all trace of your new existence from any computer systems which may give others a clue to tracking you down.

The guy in the paragraph above isn't the hero of *Silent Witness* and we have come in half-way through the novel anyway. What's the point? The point is that Ed Yourdon has written an eminently believable and all-too-realistic story of life in these computerized times. In the first half of the book he describes a completely plausible scheme for bilking $3 million out of the electronic funds transfer system used by every multiple branch bank in the country. Some inside knowledge, a few lines of code, and a few unknowing but helpful accomplices are all that is necessary. You say you don't believe it? Well, read the book and Ed Yourdon will show you how simple it is.

This explains the $3 million that you, Bernie Kaplan, have stumbled upon. In the second half of the book, some very determined people get on the trail, including the FBI, NYPD, bank auditors, a good friend and the thief who originally stole the $3 million. All would dearly love to track down Bernie and the $3 million. Although Bernie is no dummy, he is no match for the thousands of computers that keep track of every imaginable type of transaction. Pay for a hotel room in cash? It's recorded. Take a book out of a library? It's recorded. Airline and train tickets? All recorded. Credit cards? Obviously recorded.

It all comes to a head when two of the searching groups get together and learn about the existence of the original embezzlement and ...

Find out for yourself! *Silent Witness* is perhaps the most realistic and compelling novel that I have ever read in which computers play a central role. No, the story is not as complex as Ludlum or MacLean would write, but in one sense it is a great deal scarier: what is a fictional story today could happen for real tomorrow—or maybe it already has.—*DHA*.

Video Invaders by Steve Bloom. Arco Publishing Inc., New York, NY. 220 pages, $10.95, 1982.

Having seen my share of quickie softcovers, purporting to reveal everything from inside strategy to in-depth analysis of the video game phenomenon, I have become rather wary of any book containing the word "video" in its title.

When I began reading *Video Invaders*, I thought my worst fears had been confirmed. The book is written in *videolect*, an informal style of growing popularity, wherein the tone is so conventional you can almost hear the author snapping his gum. Though I felt a case of the cutesies coming on, I persevered.

It was worth it. Despite occasional lapses, *Video Invaders* is on the right wavelength. It does the job of imparting the fervor of videophiles, without losing all perspective concerning the games themselves. Among its most compelling features are interviews with game inventors and an inside look at Atari.

Bloom begins with a retrospective—a look at the state of the arcade before the advent of video games. The video game boom resuscitated an old and established arcade tradition, which floundered for some time before *Invaders* made its appearance. It is a tradition which has withstood attacks before.

The author asks a tough question, one we've looked at ourselves: Who invented the video game? He equivocates a bit on the question, and asserts his conclusion with a "would you believe" and a question mark. It is just as well, since he is able only to trace back as far as the mainframe computers at Harvard and MIT in the early sixties. (Our research uncovered a video game designed in 1958, by Willy Higinbotham. It ran on a small oscilloscope using an analog computer.)

Still, Bloom admirably traces video game history from Pong to the present day, and the story is fascinating and well told.

The author allows others to tell their own stories, and the longest chapter of the book is devoted to just this. Eight different game designers speak frankly and freely about the business—where they have been, where they are, and where they would like to be "on down the road." As I read this section, I gained some insight into a few of the minds that engineered the video game revolution.

Following this chapter is a look at Atari, or as Bloom puts it, the "IBM of the game world." It is the frankest and most complete profile you are likely to see concerning the corporation. The author toured Atari, and reports on his findings in detail. I found the chapter not only interesting, but also somewhat awesome: the growth of the company has been phenomenal.

The "problems" of video games are also examined, and while the author labels most of the anti-video attacks as "moralistic balderdash," he underscores the need for some regulation. He goes on to point out some extremely promising

SCRG Presents
FOR YOUR APPLE™ II OR II+

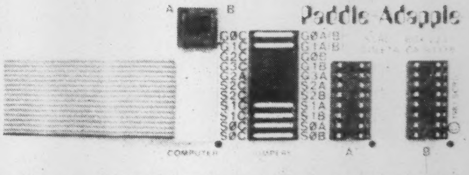
THE $79.95 NUMERIC KEYPAD
THE KEYPAD

- Converts APPLE™ keyboard to one of eight 10-key or hexadecimal keypads
- Hardware conversion—compatible with ALL software • Decals provided
- Works with any revision APPLE™ II or II+
- Instantly switches between standard keyboard and keypad • Custom layouts available
- Installs easily, no soldering
- Lowest priced numeric keypad available—$79.95

THE MAGIC KEYBOARD
Everything That THE KEYPAD Gives You, Plus . . . .

- At the flip of a switch, select beween standard QWERTY keyboard and your choice of DVORAK, A.S.K., MONTGOMERY, LEFT & RIGHT ONE-HANDED, and ALPHABETICAL ORDER
- Easy modification and optional PROM allows true upper/lower case entry.
- $89.95

Paddle-Adapple



- Works with all Apple compatible joysticks and paddles
- Unique "Jumpers" socket allows you to configure to meet your needs.
- Select one of two devices or
- Use 4 paddles simultaneously
- BPI™ users can have BPI™ device and paddles plugged in simultaneously.
- Gives you four push-button inputs
- Supports shift key modification
- Exchange X & Y joystick axis
- Small and compact—adheres to computer with supplied foam tape
- All strobes, annunciators and power available on both connectors
- LOW PRICE—$29.95

9 CARDS AND 8 SLOTS?

The EXTEND-A-SLOT brings a slot outside your APPLE™, allowing an easy change of cards. The 18" flex cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability.

The EXTEND-A-SLOT works well with all slow to medium speed cards, such as Modems, Printers, Clock, Music, etc. It is not recommended for high speed data transfer devices such as disk drive controller cards. $29.95

All these fine products come with a 90 day warranty
Available at your local dealer or direct from:
SOUTHERN CALIFORNIA RESEARCH GROUP
Post Office Box 2231-C
Goleta, CA 93118
(805) 685-1931

Add $2.50 for shipping:
CA and MA add tax

VISA, MASTERCARD accepted

Apple is a trademark of Apple Computers
BPI is a trademark of BPI Systems

CIRCLE 284 ON READER SERVICE CARD

uses of video game technology in education and therapy.

It is a requirement for books of this ilk to include a section on beating the games. This one is no exception, and though coverage is a little uneven, readers are bound to pick up at least a few pointers. One very good one is never to bring more than $10 in quarters to an arcade in a single visit.

Video Invaders may be but one of many books of its kind (this kind has appeared like mushrooms on a wet lawn), but it is one of the better ones I have seen, and one of the very few worth reading all the way through—*JJA*.

Problem-Solving on the TRS-80 Pocket Computer, by Don Inman and Jim Conlan. John Wiley & Sons Inc., New York. 261 pages, paperback $8.95. 1982.

One of Wiley's latest Self-Teaching Guides, this has a title that's a little misleading; the book teaches the Radio Shack TRS-80 PC-1 Pocket Computer (or Sharp PC-1211) from the ground up, rather than getting right into problem-solving. However, it does assume some knowledge of Basic, and doesn't spend much time on statements and commands common to other computers.

The first six chapters teach how the PC-1 operates, and get into memory use, definable mode, error codes, editing, cassette use, data files, trig functions, operation time, logic functions, and binary bins.

The next three chapters look at applications: Feedback and Systems (computer-show attendee flow, war-game problem, etc.), Random Walk, and Computing Interest. The last three chapters get back into using the PC-1, for Storing, Sorting and Searching; Chaining Programs from Cassette; and The TRS-80 Pocket Computer Printer.

Five appendixes provide a list of Basic statements and commands, special Basic functions, acceptable abbreviations, error codes, and printer terms.

The writing style is informal, with comments such as "Note: We didn't say tuck the computer into your *back* pants pocket. The...display...is made of glass. If you sit down with it in your back pocket, you may crunch the LCD." The authors are very thorough, and explain every facet of the PC-1 in clear, easily understood writing, and with many helpful illustrations and examples of LCD and printer displays. This is the sort of book Radio Shack should have provided with the PC-1.

Invitation to Forth, by Harry Katzen, Jr. Petrocelli Books Inc., Princeton, NY. 244 pages, hardcover $17.50. 1981.

"Forth is a language for doing functional programming, with specific orientation towards productivity, reliability and efficiency. Included in its capabilities are structured programming, top-down development and virtual memory. However, Forth is not merely a focal point for popular concepts. It represents a modern way of approaching programming. The structure of a Forth program and the Forth language itself is based on reverse Polish notation or post-fix notation as some computer scientists call it. This basic philosophy combined

APPLE® ATARI®
IBM® TRS-80® CP/M®
NEC® COMMODORE®
ZENITH®

Get Fast Delivery and Discount Pricing on All Hardware and Software!

- Free Delivery on $50 Orders!
- Over 1,000 Programs From Over 80 Manufacturers
- Large Inventory - Most Orders Ship Within 24 Hours
- 15 - 35% Discount On All Products

FREE CATALOG

FOR EXAMPLE:

MIN. SAVINGS	
DB MASTER ®	$54.00
VISICALC ®	$60.00
TIME ZONE	$25.00
dBASE II	$150.00

LOW COST 100% APPLE-COMPATIBLE DISK DRIVES

RANA SYSTEMS DRIVES: 20Kbytes *more* storage (double side/density delivers over 500Kbytes), 300% faster tracking, 50% better precision than Apple. Unique finger tip write/protect switch and more.

Add a drive to present Apple controller or use Rana's controller with 4 drive capacity.

MOST HARDWARE 10% ABOVE COST

SYSTEMS	PRINTERS	MONITORS	PERIPHERALS
Apple	Anadex	Adds	Rana Systems
Atari	Epson	Amdek	Orange Micro
Altos	C.Itoh	Televideo	Hayes
VIC-20	Okidata	NEC	Microtek
Zenith	IDS	Zenith	Axlon
North Star	NEC	Sanyo	Mountain Computer
Televideo	Transtar	And More!	Konan
NEC	Trendcom		Universal Data
And More!	And More!		And Much More!

BLANK DISKETTES

Elephant Memory Systems (E.M.S.)
Heavy Duty, Guaranteed 100% Error Free, with Hub Rings

	E.M.S.	Verbatim	Maxell
5¼" Single Sided Single Density, Soft Sector	$24. 5	$29.95	$38.95
5¼" Single Sided, Double Density Soft Sector 10 Sector or 16 Secto	34.	29.95	49.95
Double Sided, 8", Dysan, 3M and others			

ALL Software and Accessories From These and er Manufacturers Are Available With Full, No Hassle 90 Day arantee

Adventure International · Broderbund Software · Bu neco · Datasoft · Edu-Ware · Gebelli · Hayden · Howard · Innovative D gn · Micro Lab · Micro Pro · Microsoft · Muse · On-Line Systems · Piccadilly · Sensible · Visicorp [Personal Software] · Sirius · Stoneware · Synergistic · TG Products

FREE FAST DELIVERY! on orders over $50

Most Orders Shipped Within 24 Hours!

We take MasterCard and VISA (include card number and expiration date). Maryland residents add 5% sales tax. Include $2.00 for postage on orders less than $50.00. Add $1.50 for C.O.D. orders. Foreign and hardware extra. Prices subject to change. Some prices reflect 3% cash discount.

Apple is a Registered Trademark of Apple Computer, Inc.
ATARI is a Registered Trademark of ATARI, Inc.
TRS-80 is a Registered Trademark of Tandy Corporation.

VISA
MasterCard

Send For Free Catalog.

DYNASOFT/CHROMANETICS
4084 HOWARD AVENUE • KENSINGTON, MD 20895

BALTO. - ANNAPOLIS (301) 532-2506
MD., D.C., NORTH VA. (301) 949-4488
OUTSIDE MARYLAND 1-800-368-2805

CLIP & SAVE

CIRCLE 134 ON READER SERVICE CARD

with an effective definitional structure permits a high degree of language flexibility and the ability to customize the language to the requirements of a particular application environment," according to the dust jacket.

The book assumes familiarity with programming, having been written as an introduction to Forth "for computer professionals, engineers, business analysts, and the creative and energetic group of microcomputer enthusiasts."

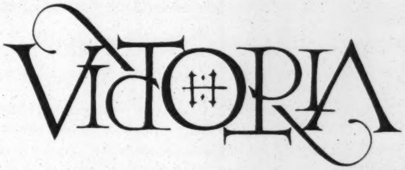
After a brief introductory chapter on RPN and the concept of Forth, the author goes into Computer Fundamentals; Software Technology; RPN; Elementary Calculations and Stack Manipulation; Constants, Variables, and Memory Operations; Definitions and Terminal Operations; Control Structures; Double Precision; and Information Management. Each chapter ends with a few exercises; the answers are all at the end of the book.

The writing is in a formal, compact, no-nonsense style. The text is one of the very few books printed on a dot-matrix printer; without descenders, the font isn't all that easy to read, but those who want a good grounding in Forth won't mind all that much, because the book is well worth the extra effort required to read it.

Inversions: A Catalog of Calligraphic Cartwheels, by Scott Kim. Byte Books, division of McGraw-Hill, Peterborough, NH. 123 pages, paperback $8.95. 1981.

Written by a doctoral student in Computer Science at Stanford University who is also a concert pianist and composer (according to the Byte catalog), this fascinating collection of letters and words turned into art was in part generated with the help of a computer graphics language.

The book is full of "intriguing designs, words that read the same right-side up and upside down, words-within-words, and unexpected symmetries," to quote again from the catalog. There are over 50 illustrations to admire, to wonder how they were created, to Xerox for friends, and to wish one had the talent to create.



Equally fascinating to the computer-freak is the text that follows the illustrations, in which the author first discusses symmetry, vision, letterforms and processes, then looks at some examples in detail, the canon as the musical analog of inversion, palindromes, and the works of Escher. The book ends with comments on each illustration and a bibliography of three dozen books on subjects ranging from designing with type to Bach.

This is a fine gift book for artists, computerniks, or anyone who loves beauty in mathematics and design. Or to keep for yourself, as delightful examples of how far the imagination can be stretched. ☐

APPLE HARDWARE
201 838-9027
NEW

THE TACKLER™
DUAL • MODE PARALLEL INTERFACE FOR THE APPLE*
2 BOARDS IN ONE FOR NO MORE COMPATIBILITY PROBLEMS!

An intelligent board to provide easy control of your printer's full potential. Plus a standard parallel board at the flip of a switch -- your assurance of compatibility with essentially all software for the APPLE*. Hires printing with simple keyboard commands that replace hard to use software routines. No disks to load. Special features include inverse, doubled, and rotated graphics and many text control features, available through easy keyboard or software commands.

It's simple to print HIRES graphics from an APPLE computer with The Tackler from TYMAC. This is the first truly universal parallel interface! Plus the ROM for your specific printer. Sophisticated intelligence when you need it, total compability that never lets you down.

Change printers -- no need to buy another board. Just plug in one of our ROM'S and you're all set. ROM'S available for Epson, C. Itoh, NEC, and Okidata -- others available soon.

You've asked us to make the TACKLER better than the others and we did. $159.00 *

UPGRADEABLE PARALLEL PRINTER CARD

A Universal Centronics type parallel printer board complete with cable and connector. This unique board allows you to turn on and off the high bit so that you can access additional features in many printers. Easily upgradeable to a fully intelligent printer board with graphics and text dumps. Use with EPSON, C. ITOH, ANADEX, STAR-WRITER, NEC, OKI and others with standard Centronics configuration. **$139.00**

THE PERFORMER PRINTER FORMATTER BOARD for Epson, OKI, NEC 8023, CITOH 8510 provides resident HIRES screen dump and print formatting in firmware. Plugs into Apple slot and easy access to all printer fonts through menu with PR# command. Use with standard printer cards to add intelligence. **$49.00** specify printer.

THE MIRROR FIRMWARE FOR NOVATION APPLE CAT II*
The Data Communication Handler ROM Emulates syntax of an other popular Apple Modem product with improvements. Plugs directly on Apple CAT II Board. Supports Videx and Smarterm 80 column cards, touch tone and rotary dial, remote terminal, voice toggle, easy printer access and much more.
List $39.00 Introductory Price **$29.00**

DOUBLE DOS Plus
A piggy-back board that plugs into the disk-controller card so that you can switch select between DOS 3.2 and DOS 3.3. DOUBLE DOS Plus requires APPLE DOS ROMS. **$39.00**

Super PIX SOFTWARE

The Software package that will allow your printer to dump page 1 or page 2 of the Apple Hires screen horizontally or vertically. Use with EPSON* MX-80 with or without GRAFTRAX* Roms, MX-70 – OKI* Microline 80, 82, 83, 82A, 83A – C. ITOH* 8510 and NEC 8023A. Requires Tymac Parallel Printer Board PPC-100 . . . **$24.95.**

APPLE LINK – A versitile modem utility that provides the Apple user the ability to transfer disk files and software over the phone. Only one package needed for full transfers. Compatable with all DOS file types: **$59.00**
(requires Hayes Micro Modem)

THE APPLE CARD – Two sided 100% plastic reference card Loaded with information of interest to all Apple owners. **$3.98**

NEW FOR THE VIC 20®

WORD WIZARD

A user friendly **WORD PROCESSOR** with full joystick control (use of joystick optional). Easy edit and string manipulation commands that follow the standard VIC 20* format. Full use of function keys for ease of use. Only **$34.95***
*Requires at least 8K RAM cartridge.

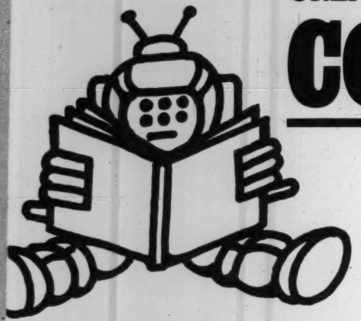
*Call or write us for information on our other EXCITING ITEMS FOR THE VIC**

VISA MasterCard
MICRO-WARE DIST. INC.
P.O. BOX 113 POMPTON PLAINS, N.J. 07444
Dealer and Distributor Inquires Invited.

CIRCLE 315 ON READER SERVICE CARD

CREATIVE COMPUTING PRESENTS...

COMPUTER BOOKS!



Basic Computer Games

A complete anthology of 101 favorite games and simulations, each complete with sample runs, program listings and description. All games run in standard Microsoft Basic and are easy to use with any computer. There are games just for fun, to develop logic strategies, to teach environmental solutions, to simulate athletic competition, to play alone or with a group. Edited by David Ahl with illustrations by George Beker. Large format paperbound, 200 pages.

#6C.... **Basic Computer Games** . . $7.95 ($1.50)

More Basic Computer Games

Here are 84 new Microsoft Basic games to challenge you! Includes program listings, sample runs, and a Basic conversion table to make these games easy to use on any computer. Edited by David Ahl and Steve North, illustrated by George Beker. Large format paperbound, 200 pages.

#6C2.... **More Basic Computer Games**. $7.95 ($1.50)
#6C4.... **More Basic Computer Games/TRS-80**. $7.95 ($1.50)

Computers for Kids

An easy-to-understand, step-by-step approach to programming for kids. Everything from what a computer is and how to create a flowchart to writing simple games and drawing pictures that move. Also a section of helpful hints for parents and teachers, and detailed lesson ideas. An excellent elementary introduction. By Sally Greenwood Larsen. Large format paperbound.

#12G.... **Computers for Kids/Apple** $3.95 ($1)
#12H.... **Computers for Kids/TRS-80** $3.95 ($1)
#12J.... **Computers for Kids/Atari** . . $3.95 ($1)
#12S.... **Computers for Kids/Sinclair** $3.95 ($1)

Computers in Mathematics

Whatever grade you teach, you'll find plenty of ways to approach mathematical concepts in *Computers in Mathematics*. Here are 134 articles and applications written for *Creative Computing* by math teachers. Flowcharts, programs, and sample runs. Over 250 problems, puzzles and programming ideas on everything from simple binary counting to multiple regression analysis and differential equations. 224 pages, large-format paperbound book.

#12D.... **Computers in Mathematics**. $15.95 ($2)

The Best of Creative Computing

Articles, learning activities, fiction, games, programs, reviews, cartoons and puzzles from *Creative Computing*. Volume 1 includes computer applications in education and recreation. Volume 2 includes languages, programming theory and artificial intelligence. Volume 3 includes features on technology, public access, medical applications and computers in music. 300+ pages per volume.

#6A.... **Vol. 1, Best of Creative Computing**. $8.95 ($2)
#6B.... **Vol. 2, Best of Creative Computing** $8.95 ($2)
#12C.... **Vol. 3, Best of Creative Computing**. $8.95 ($2)

creative computing Dept CN25 • 39 E. Hanover Avenue • Morris Plains, NJ 07950

Please send me the following books:

Book Number	Quantity	Title	Price Each	Total Price

Add postage and handling figures in parentheses ( ) following item price. Outside U.S.A., add $3.00 per order.

Subtotal* $
Postage and Handling $
Total $

☐ **Payment enclosed** $ ____________
*(NJ Residents add 5% sales tax.)

☐ **Charge my:** ☐ American Express ☐ MasterCard ☐ Visa
(Charge and phone orders: $10 minimum.)

Card No. ____________ Exp. Date ____________
Signature ____________
Mr./Mrs./Ms. ____________ (please print full name)
Address ____________
City/State/Zip ____________

CHARGE ORDERS: For your convenience, **PHONE TOLL FREE: 800-631-8112.** (In NJ only, 201-540-0445.)

the creative computer mart

SOFTWARE AND HARDWARE SHOPPERS GUIDE

Please Direct Inquiries to: Jim Beloff; (212) 725-4216.

PREMIUM DATA CASSETTES

* Manufacturers Wholesale Prices *

LENGTH	1 CASSETTE	100-PACK	500-PACK
C-10	.59	.54 ea.	.45 ea.
C-20	.66	.61	.53
C-60	.89	.83	.79
C-90	$1.29	$1.21	$1.14

SOFTWARE PUBLISHERS—Let Acts Audio provide you with all your cassette production requirements.

CUSTOM SOFTWARE DUPLICATION—For Sinclair, TRS-80, Apple, Atari —— Guaranteed to load.

Acts Audio also sells High-Speed duplication equipment modified for software duplication.

ACTS AUDIO, INC.
70 West Illiana Ave,
Orlando, FL. 32806
(305) 423-0338

VERSACALC!

VERSACALC!
VERSACALC!
VERSACALC!
VERSACALC!
VERSACALC!
VERSACALC!
VERSACALC!

TM

TUTORIAL
UTILITIES
AND FILE MANAGER

ENHANCEMENTS TO VISICALC*

- ★ **SORT** any number of rows labels values formulas You select the extent of the sort
- ★ **CONDITIONAL TESTING** to several levels
- ★ **PRINT OUT THE LIST OF COMMANDS**
- ★ **AUTO BATCH UPDATE** e.g. running year-to-date forms
- ★ **MENU—DRIVEN MODULES** for your own application programs
- ★ **AUTO-CATALOG** from within Visicalc
- ★ **AUTO SCREEN FORMAT** saves hundreds of keystrokes

YES! We said. "SORT VISICALC!"

VERSACALC runs within Visicalc.

Versacalc is a trademark of Versacalc Enterprises
Visicalc is a trademark of Visicorp Inc
Apple, Apple II, Applesoft are trademarks of Apple Computers, Inc

Apple	100.00
Commodore	125.00
IBM Personal Computer	150.00
Apple ///	150.00

Dealer Demo Disk Available

Anthro-Digital, Inc.
103 Bartlett Avenue
Pittsfield, MA 01201
413-448-8278

New! FROM Aplogica New!

IBM*

Personal Computer

LASER — — ZAP

A new sound/graphics game!

Laser zap the aliens as they sweep across the void towards you! Requires 64k & disk BASICa.

$29.95

Call toll free now
1-800-547-5995

VISA OR MASTERCARD

* TRADEMARK OF INTERNATIONAL BUSINESS MACH. CORP.

UNIPROM

THE VERSATILE EPROM HANDLING SYSTEM

- *Reads programs 2704, 2708, 2758, 2508, 2516, 2716 (single supply), 2532, 2732, INTEL'S 2732A and the 8755A (INTEL NEC) with no personality modules required! All power is derived from the S-100 bus, all signals are S-100 compatible. Port mapping occupies NO memory space.*
- *An on-board wait-state generator allows use with bus clock rates exceeding 6mhz., with no loss in performance.*
- *All software is 8080 8085 Z80 compatible and is fully CDOS and CP M compatible. Software includes "menu" command. "Intelligent" EPROM read write and disk I O commands, and functions usually found only in "monitors" and "debuggers"*

UNIPROM board (A & T) with extensive documentation, including source listings — $199.00.

UNIPROM disk-based software with source on disk and listing (specify 5.25" or 8" CDOS or CP/M, or NORTHSTAR 5.25" CP/M) — $38.00.

UNIPROM EPROM-based software (2532) $55.00.

CDOS is a registered trademark of CROMECO, INC.
CP/M is a registered trademark of DIGITAL RESEARCH, INC.
NORTHSTAR is a registered trademark of NORTHSTAR COMPUTER, INC.

CER-TEK, INC.
6020 Doniphan Drive
El Paso, Texas 79932
(915) 581-6697

PRICE BREAK

EPSON MX-80

CARTRIDGE RIBBONS

$9.95 EA.

$107.46 per dozen
Minimum Order 3 Ribbons
Price Includes Shipping
We accept Mastercard and Visa

CHECK-MATE™
P.O. BOX 103, RANDOLPH, MA 02368
Call Toll Free - 1-800-343-7706
In Massachusetts - 617-963-7694

ATARI* SOFTWARE ADVENTURES AND GAMES

Each adventure takes up to an hour and is programmed with random variables to change the game every time you play.

THE TALISMAN OF POWER

A search through many obstacles for the four keys of Gremlock. Will you get out alive? 16K - $18.95.

THE GHOST TOWER

Find a Magical Gem in a tower haunted with Orcs, goblins, etc. 16K - $16.95.

SUPER SHAPE BUILDER

A graphics game mainly for children from age five. 'Draw' your own pictures with your joystick, in color. 8K - $9.95.

Send Check or C.O.D. - Discs $4.00 extra. *SATISFACTION GUARANTEED.* Write for further information on our GALAXIAN ADVENTURE and other software. Dealer Inquiries welcome. Continental Adventures, 4975 Brookdale, Bloomfield Hills, MI 48013. (313) 645-2140.

* Indicates Trademark of Atari, Inc.

5¼" Floppy Disk Drives

(Direct IBM® Plug-in)

TANDON Model TM 100-1 . . $199* ea.
TANDON Model TM 100-2 . . $299* ea.
12" Green Phospher Zenith Monitor . . $109* ea.

Also available - TM 602S, 603S, and 603E Winchester Drives

For info or orders call — 316-683-9225
or 316-685-9445

MC / VISA or C.O.D. with certified check or money order. Kansas residents add 3% sales tax.

* Plus shipping.

gh computer systems

G-H Computer Systems, Inc.
923 Longfellow Street
Wichita, KS 67207

"DISC DOUBLER PROGRAM"

"DOUBLE THE STORAGE CAPACITY ON YOUR SS/SD OR SS/DD 5¼ INCH DISKETTES."

NOW YOU CAN INCREASE THE SIZE OF USEABLE SPACE ON YOUR SS/SD OR SS/DD 5¼ INCH DISKETTES.

ALL YOU PAY IS A ONE TIME FEE OF $12.95. USE THIS PROGRAM OVER AND OVER, AS OFTEN AS YOU LIKE, NO EXTRA FEES. THIS PROGRAM WILL WORK WITH ALMOST ALL SS/SD OR SS/DD DISKETTES. HURRY, SEND $12.95 U.S., CASH, CHECK, OR MONEY ORDER. VISA AND MASTERCARD BUYERS TELEPHONE TOLL FREE.

DISK DOUBLER PROGRAM
CP-M COMPANY
P.O. Box 1045 DEPT. CCO
WOODLAND HILLS, CALIFORNIA 91365
Nationwide 800-428-7825 Ext. 43
CA. Residents Only 800-428-7824 Ext. 43

California residents add 6% sales tax, Los Angeles residents add 6.5% sales tax. Please include $1 postage and handling. All orders shipped within 10 days. Disk doubler program copyright 1982 by computer peripheral-material company.

The Quality Leader in

COLOR COMPUTER GAMES

send for our FREE FLYER more coming soon

ARCADE GAMES

Space Invasion
ASTRO BLAST
BERSERK
CAVE HUNTER

Cassette (16k) $24.95
Disc. (32k) $29.95

ADVENTURE GAMES

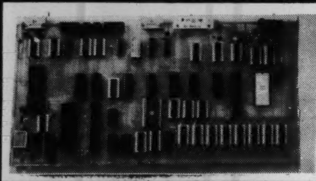
Calixto Island
The Black Sanctum

Cassette (16k) $19.95

Pre paid shipping on domestic orders
Over seas add $3.00
California residents add 6% tax

MARK DATA PRODUCTS
23802 Barquilla • Mission Viejo, CA 92691
(714) 768-1551

HY-TYPE 1 & 11 • QUME



INTELLIGENT PRINTER INTERFACE

16,000 BYTE BUFFER / STAND ALONE
PARALLEL / SERIAL INPUT (BAUD RATES - 50 to 19,200)
OPTIONS INCLUDE: GRAPHICS • REVERSE PRINT • BOLD PRINT
UNDER-SCORE • REPRINT OF BUFFER
ADJUSTMENT OF LINES PER INCH
CHARACTERS PER INCH SELECTION
DOUBLE LINE

CUSTOM OPTIONS ALSO AVAILABLE

A & T FROM $450.00 BARE BOARD FROM $125.00

MASTER CARD & VISA ACCEPTED

WARN ELECTRONICS, LTD.
PO BOX 526 KNIGHTDALE, NC 27545 (919) 266-9411

MICRO-WINDOW

6502 TRAINING/DEVELOPMENT PROGRAM

HOME • SCHOOL • INDUSTRY

Micro-Window uses HI-RES graphics to display a programming model which shows, in binary, the contents of all 6502 registers as machine language instructions are executed.

Micro-Window completely simulates a microprocessor system with 2K of RAM starting at address zero. Programs can be loaded into the 2K RAM and run while observing their execution in the model, or instructions can be entered one at a time and immediately executed to see their effect on the current state of the model.

Very Easy To Use APPLE II PLUS
48K DOS 3.3

$120 WINDOW **RESEARCH**
13452-A N.E. 175th Suite 218
Woodinville, Washington 98072

Make a Living at "21"

A Blackjack Program unique in its ability to teach card counting strategies.

The program will effectively teach card counting strategies with more precision and speed than previously possible. Five proven strategies are taught, each with increasing complexity. Twelve user-alterable rules enable learning strategies specific to any casino in the world. Incorrect player actions are signaled and remembered for subsequent use. Other learning aids are also included, and of course normal casino-style black-jack can be played at any time. Comprehensive manual with 42 Las Vegas Casino game rules $10. Applicable to Software purchase only $80.

CP/M with cursor addressable screen.
Send Check or Money order to:

XANADU ENGINEERING
1653 Minorca, Costa Mesa, CA 92626
(714) 641-0686

CP/M is a trademark of Digital Research.

ADVERTISE!

Creative Computer Mart ads really generate sales! $330 each, 6x $315 each, 12x $300 each. Send ad and payment to:

creative computing
CLASSIFIED AD DEPT.
ONE PARK AVENUE
NEW YORK, NY 10016

OR CALL COLLECT:
LOIS PRICE (212) 725-7226

IBM — XEROX — TRS-80 — CBM
HEWLETT-PACKARD — NORTHSTAR
DEC — HEATH — ZENITH — PMC
OSBORNE — OSI — INTERTEC . . .

WE HAVE

THE CONNECTION

Connect your IBM Selectric®, IBM Electronic, or Olivetti typewriter to any Microcomputer.

UNDER
$600

ESCON Products, Inc.
12919 Alcosta Blvd.
San Ramon, Ca. 94583
(415) 820-1256

(800)
227-2148

ONE STOP FOR

SINCLAIR
ZX81
SOFTWARE

WRITE FOR FREE CATALOG AND FREE PROGRAM LISTING OF MASTERMIND

SOFTSYNC, INC.
P.O. Box 480, Murray Hill Station,
New York, N.Y. 10156
(212) 685-2080

★MICROCOMPUTER★
BUSINESS
SOFTWARE

MEDICAL MGMT...
DENTAL MGMT...
INSURANCE AGENT
LEGAL BILLING.....
PROPERTY MGMT..
AND MUCH MORE !

UNIVAIR INTERNATIONAL
10327 Lambert International Airport
ST. LOUIS, MISSOURI U.S.A. 63145
(314) 426-1099

YORK 10
BASF-DPS
WORLD STANDARD TAPE

MONEY BACK GUARANTEE

PREMIUM
5-SCREW SHELL FITS ALL
STANDARD RECORDERS

COMPUTER GRADE BLANK CASSETTES

"We monitored the output to the computer with a specially built meter and found absolutely no dropouts throughout the tape . . ."
Stace Papadopoulos
Beaverton, OR

ITEM	1 DOZ.	2 DOZ.
C-05	☐ 7 50	☐ 13 50
C-10	☐ 8 00	☐ 14 40
C-20	☐ 10 00	☐ 18 00
Hard Box	☐ 2 50	☐ 4 00
Soft Box	☐ 2 00	☐ 3 40

Calif. residents add 6% sales tax
Shipping 1 doz $2 2 doz $3 50
3 doz $4 50 Each additional doz
$ 50

Write or call for QUANTITY DISCOUNTS

VISA for IMMEDIATE SHIPMENT on Credit Card Orders Master Card

Call: 213/710-1430

YORK 10 Computerware
24573 Kittridge St., C-1 Canoga Park, CA 91307

DISCOUNT PRICES FOR APPLE II PRODUCTS

Rana 40 Track Drive	$349.00
Videx 80 Column Video Term	$235.00
Videx Enhancer II	$105.00
Videx Function Strips	$ 65.00
Mountain Computer CPS	$177.00
Mountain Computer 32K	$163.00
Prometheus 16K	$ 79.00
Laser Lower Case Plus	$ 45.00
Laser Keyboard Plus	$ 70.00

NEW ENGLAND FRUGALITY AT ITS FINEST.
Yankee Micro, P.O. Box 601, Milford, NH 03055.

FREE

business software directory

- Radio Shack's Model I, II, III
- Heath's HDOS
- CPM: Xerox, Alto...
- IBM PC

Data base manager, integrated accounting package, inventory, word processing, and advanced mailing list.

Micro Architect Inc.
96 Dothan St.
Arlington, MA 02174

NOW AVAILABLE, CRT STAND
FOR XEROX 820-822-860 COMPUTERS

FINALLY. A GOOD LOOKING QUALITY STAND ENABLING XEROX 820-822-860 USERS TO ELEVATE AND PIVOT THE CRT WHILE IMPROVING AIR CIRCULATION.
UNIQUE DELTA DESIGN. GIVES MAXIMUM SUPPORT USING LESS DESK SPACE THAN THE CRT ITSELF. STRONG ENOUGH TO SUPPORT 8" DISC DRIVES AND CRT. PIVOTS 180°

THIS STAND MAY BE USED WITH *ANY* CRT DEVICE AND WILL ELEVATE THE CRT 3⅛". OPTIONAL ADJUSTABLE "FEET" ALLOWS INCREASED HEIGHT IF REQUIRED.

STEEL W/WOOD GRAIN VINYL FINISH $33.95
XEROX "PUTTY" COLOR FINISH $35.95
ALUMINUM W/XEROX "PUTTY" COLOR FINISH $42.95

SEND CASH, CHECK OR MONEY ORDER. VISA AND MASTERCARD BUYERS TELEPHONE TOLL FREE.

COMPUTER PERIPHERALS—
MATERIALS COMPANY
P.O. BOX 1045 DEPT SBO
WOODLAND HILLS, CALIFORNIA 91365
NATIONWIDE 800-428-7825 EXT. 43
CA. RESIDENTS ONLY
800-428-7824 EXT. 43

DEALERS AND DISTRIBUTOR
INQUIRIES WELCOME

California Residents add 6% sales tax. Los Angeles residents add 6.5% sales tax. Can be shipped UPS. PARCEL POST Weight 3 lbs. In the Continental U.S. add $2.50 postage and handling. $5 elsewhere. Xerox 820-822-860 Trademark and product of Xerox Corp. Patent pending CP-M Company 1982.

HAYES
MICRO MODEM II
FOR THE
APPLE II
$259.* PLUS SHIPPING

VIDEX 80 COLUMN CARD
$237.* PLUS SHIPPING

THE COMPUTER CENTRE

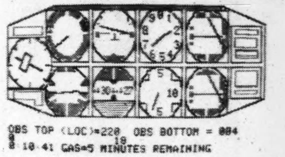
49 NORTH CENTRE STREET
CUMBERLAND,
MARYLAND 21502
301-777-1000

CHECKS, MONEY ORDER,
VISA, MASTERCARD ACCEPTED

CALL US FOR OUR COMPLETE HARDWARE AND SOFTWARE CATALOG!

***PROMOTION RUNNING**
FOR A LIMITED TIME ONLY

1982 VERSION IFR SIMULATOR



```
OBS TOP (LOC)=220  OBS BOTTOM = 084
0            10
8 10 41 GAS=5 MINUTES REMAINING
```

APPLE II PLUS 48K DOS 3.3

A real IFR Simulator with X Y Plot and all the good stuff you used to pay $10,000 for. $50.00 at your Computer store, or direct from

PROGRAMMERS SOFTWARE
2110 N 2nd St
Cabot AR 72023
(501) 843-2988.

LEARN

Having trouble learning to use your computer?

Reference manuals don't teach. Most BASIC texts don't cover specific personal computers.

TIS solves these problems with step-by-step books tailored for your machine.

For PET/CBM

Understanding Your PET/CBM $16.95
Vol 1: Basic Programming
PET Graphics .... $ 6.95

For OSI CIP/C4P

Understanding Your C1P/C4P .... $ 9.95
A Workbook of BASIC Exercises

For VIC

Understanding Your VIC $13.95
Vol. 1: Basic Programming

Dealer inquiries invited.

Money Back Guarantee. VISA/MC accepted.
All prices include UPS or 1st Class postage.

TIS INC

Total Information Services, Inc.
Box 921, Dept. CC
Los Alamos, NM 87544

SYNCHRO-SETTE

The Subscription Magazine for the Sinclair ZX-81/TS-1000 Microcomputers

Games, Educational, Business, Graphics Tutorial, Etc.

12 Mo. Issues — 6 Bi-Month
CASSETTES
AT LEAST 6 PROGRAMS EACH

$39.50

Ill. Residents add $2.07 tax
outside USA add $10.00

Ask for operator # 383
24 Hr. Hot Line 800-543-1300

THE S & S COMPANY
388 W. Lake Street
Addison, IL 60101
(312) 628-8955

ELIZA IS HERE!

AT LAST! A FULL IMPLEMENTATION of the original ELIZA program is now available to run on your microcomputer!

Created at MIT in 1966, ELIZA has become the world's most celebrated artificial intelligence demonstration program. ELIZA is a non-directive psychotherapist who analyzes each statement as you type it in and then responds with her own comment or question — and her remarks are often startlingly appropriate!

Designed to run on a large mainframe, ELIZA has hitherto been unavailable to personal computer users except in greatly stripped down versions lacking the sophistication which made the original program so fascinating.

Now, our new microcomputer version possessing the **FULL** power and range of expression of the original is being offered at the introductory price of only $25. And if you want to find out how she does it (or teach her to do more) we will include the complete **Source Program** for only $20 additional.

Order your copy of ELIZA today and you'll never again wonder how to respond when you hear someone say "Okay, let's see what this computer of yours can actually do!"

ELIZA IS AVAILABLE IN THE FOLLOWING DISK FORMATS:

1. Standard 8 inch single density for all CP/M based computers
   $25 for ELIZA COM - add $20 for Microsoft BASIC-80 Source
2. 5¼ inch CP/M for Apple II equipped with Z-80 SoftCard
   $25 for ELIZA COM - add $20 for Microsoft BASIC-80 Source
3. 5¼ inch for 48K Apple II with Applesoft ROM and DOS 3.3
   $25 for Protected File — add $20 for Applesoft Source
4. 5¼ inch for 64K IBM Personal Computer
   $25 for Protected File — add $20 for BASIC Source

ARTIFICIAL INTELLIGENCE RESEARCH GROUP
921 NORTH LA JOLLA AVENUE, Dept. R
LOS ANGELES, CALIFORNIA 90046
(213) 656-7368 (213) 654-2214
MC, VISA and CHECKS ACCEPTED

COMPUTERWARE
products for

COLOR COMPUTER

SOFTWARE
Color Invaders • Pac Attack • Monitor • Adventure Games • Text Editors • Assemblers • PASCAL • Finance • Color Data Organizer
Starship Chameleon • Berserk
Scribe Word Processor
Address Factory • Home Money Manager
Forth • *FLEX software • Mazerace

HARDWARE
16 K / 32 K / 64 K Memory Expansions
Lower Case Adapter • Cables • Interfaces • Printers

ACCESSORIES
Books • Cassettes • Supplies • Service Manuals

Dealer inquiries invited

*FLEX is a trademark of TSC.

Call or Write:
COMPUTERWARE
Dept. C • Box 668
Encinitas, CA 92024 • (714) 436-3512
6809 Specialists

Computerware is a trademark of Computerware

PAPER

FANFOLD BOND PAPER 9½x11
Perforated both sides, snaps out to 8½x11
Three Choices for the Same Price:
15 lb. stock, 3200 sheets, 1-part
18 lb. stock, 3000 sheets, 1-part
20 lb. stock, 2500 sheets, 1-part
23.95

SPECIAL WHITE BOND
Blank, 1-part, 9½x11, 2200 sheets
Letterhead quality paper (20 lb.-25% cotton)
Special strip-offs produce smooth 8½x11 sheet
Selling elsewhere for $60 per 1000 sheets
75.95

HALF-INCH GREENBAR
15 lb. stock, not perforated on sides
8½x11, 3200 sheets, 1-part 23.95
14⅞x11, 3200 sheets, 1-part 35.95

Send check with order. Add $6.00 per box for handling and shipping (UPS) within continental US. Calif. residents add 6½% sales tax. Satisfaction guaranteed.

Call or write for free catalog and samples.

BOB'S CHARTS
Computer Paper Dept.
405 E. THIRD, SUITE 206C
LONG BEACH CA 90802
(213) 435-3492

☆☆ SUPER™ ☆☆ ISA's DATABASE

The only DBMS with all these features:

- ★ PROVEN in one year of test marketing
- ★ TOUGH, reliable file structure
- ★ MENU driven for simplicity and easy use
- ★ ARITHMETIC with stored calculations
- ★ FAST set-up and report formating
- ★ CLEAR user-oriented documentation
- ★ PRINTS totals & subtotals – mail labels
- ★ REFORMATS and merges data files
- ★ MULTI-DISK files: Up to 128K records
- ★ SORTS full disks on up to 40 fields
- ★ PRODUCTION input of repetitive data
- ★ USE existing data files
- ★ COUPLES to word processors
- ★ POSTS transactions to master file
- ★ SEARCH by strings, ranges, comparisons
- ★ DATA COMPRESSION: Over twice as many labels as the other system

For TRS-80* Models I, II, III, & 16 – 250.00
CP/M† – 295.00

CDC
13715 Vanowen St., Dept. CC
Van Nuys, CA. 91405
(213) 873-6621

**T.M. Tandy Corp.* *† T.M. Digital Research*

LIFETIME CERTIFIED DISCS

These high-quality blank discs from Allenbach Industries are guaranteed for a lifetime and have HUB REINFORCED RINGS. Sold in boxes of TEN.

5¼" double density (Specify soft, 10 or 16 sectors)	
Single sided	$30.95
Double sided	35.95
8" single density	34.95
8" double density	40.95

Write for full catalogue of EXCITING GAMES and product lines.

CDE 2463 McCready Ave
Los Angeles, California 90039
(213) 661-2031

SINCLAIR/TIMEX 1000 ZX81/TIMEX

TouchaMatic™ Overlay
$9.95 plus $1.50
Postage/Handling
Call or send for FREE Catalog.

SIGNALMAN MODEM
- Direct Connect
- 300 Baud
- Easy to use
- Accurate

$99.95 Plus $3.00 Postage/Handling.

KOPAK Creations, Inc.
Dept. CC1
448 W. 55th. St.
New York, N.Y. 10019
(212) 757-8698
24 Hours MasterCard/Visa

SUPER SALE
FOR APPLE II®

DISK DRIVES	$279.95
16K RAM BOARD	$ 49.95

Run Pascal Applesoft/Integer Basic, Etc.

To Order send check or money order To:

EVERTEK
P.O. Box 1311
Provo, Utah 84603
801 373-5389

Please add $2.00 shipping/handling. In Utah add sales tax.

YOU CAN SAVE $$$

5¼" DISKETTES (Soft or Hard Sector) Box of 10	
Single Side/Double Density	$25.25
Double Side/Double Density	$31.25

Altos • North Star • Zenith Data Systems

RIBBONS FOR:	
Anadex DP 9500/9501	$14.00
Centronics 700 Series	
Zip Pack (Package of 3)	$ 8.25
Cartridge	$ 8.50
D.E.C. LA-34 (Box of 6)	$30.00
Diablo 630 (Box of 6)	$25.90
Epson MX 70-80	$12.95
NEC Spinwriter (Box of 6)	$24.00
Okidata Microline 80 (Pkg of 3)	$ 8.90
Qume (Boxes of 6)	
(Black)	$19.00
(Red, Green, Blue or Brown)	$16.00
Texas Instruments 810 (Bx of 6)	$19.00

Plus many others · Call for more information

CHECK · MASTER CARD · VISA Accepted
Add **$3.00** for Shipping & Handling:
Illinois Residents Add 6% Tax

ILLINOIS COMPUTER PRODUCTS CO.
P.O. Box 112
Mt. Prospect, IL 60056 **(312) 228-5590**

YOU ARE GOING TO SMILE!

--When you see our Computer 'Source-Book©'...over 2,000 books, software, and accessories for all major brands. A few examples are listed here:

Introduction to Word Processing	$12.95
How to buy the Right business computer	$8.95
Business System Buyers Guide	$ 7.95
Using Micros in Business	$ 9.95
Your Home Computer, an intro guide	$12.95
Computer Dictionary	$15.95
How to computerize your business	$ 7.95
How to make money with micros	$12.95
1001 things to do with your micro	$ 7.95
Computer Graphics Primer	$14.95
Guide to Atari 400/800 systems	$16.95
Atari™ games and recreations	$12.95
Atari™ Sound and Graphics	$ 9.95
Inside Atari™ DOS	$19.95
80 Time saving programs / TRS-80™	$ 9.95
Intro to TRS-80™ Graphics	$11.95
55 TRS-80™ Color Computer programs	$ 9.95
TRS-80™ Color Computer Graphics	$14.95
Understanding Your Vic-20	$11.95
Computer "Source Book", 2000 items	$2.00

Orders under $25.00 add $2.50 for handling. MasterCard or Visa accepted on orders over $25.00, send card #; expiry date, bank # on MC

DEALERS INQUIRIES WELCOME

JMC "THE SOURCE" For: Personal Computer Software Books, Games & Accessories

DEPARTMENT: G-9
1025 Industrial Dr., Bensenville, IL 60106

THE LAST ONE™

THE PROGRAM THAT WRITES PROGRAMS

AVAILABLE FOR

CP/M
Apple II Plus
Sharp PC 3201
TRS - 80 MOD II
North Star Advantage

Still Only $600.00

Dealer Inquiries Invited

Send to **KROWN COMPUTING**
1282 Conference Dr., P.O. 66763
Scotts Valley, CA 95066
(408) 335-3133

PC/FORTH

Complete FORTH program development systems for the IBM® Personal Computer. Packages include interpreter/compiler with virtual memory management, line editor, custom screen editor, assembler, decompiler, utilities, file and record access modules, and many demonstration programs. 100 page user manual $100.00

Floating point arithmetic extensions and cross compiler available at additional cost.

Ready to run under PC-DOS or CP/M-86® Standalone version available soon. 64 kbytes RAM and two disk drives recommended. (IBM is a registered trademark of International Business Machines Corp. CP/M is a registered trademark of Digital Research, Inc.)

Laboratory Microsystems
4147 Beethoven Street
Los Angeles, CA 90066
(213) 306-7412

NEW

COMPUTER MART
FORMAT
3" x 2"

PICTURE YOUR AD HERE!

NEXT CLOSING DATE:
OCTOBER 13

BRAND NAME DISKETTES

WITH HUB RINGS AND WRITE PROTECT
GUARANTEED **100%** ERROR FREE

5 SS/SD
All Sizes Available
19.95 (add $2.00 per box for less than 100)

WATCH FOR THE CAPTAINS MONTHLY SPECIALS!

CAPTAIN
MEGABYTE
"Captain" MEGABYTE TM.

EPSON MX 80 RIBBONS
$6.00 ea.
Min 3.
SAVE 50 %
ON MOST PRINTER RIBBONS

WESTWORLD
4699 S.W. 45th Street
Davie, Florida 33314
(305) 587-1130

VISA
MC
C.O.D.

HOT LINE 800-327-1013

IBM PC® ⟷ MX-80®
OSBORNE I® ⟷ MX-80®

PARALLEL PRINTER CABLES

MX-80/Centronics® type parallel printer cables:
#I1 — IBM PC compatable — $35.00.
#O1 — OSBORNE I IEEE 488 port compatable — $35.00.

VERBATIM 5″ SSDD soft sectored diskettes — $33.00/Box of 10.

—FREE SHIPPING, 10 DAY FREE TRIAL—

VISA, MASTERCARD, COD (ADD $2.00).
TX res add 5%.

AUSTIN COMPUTER
TECHNOLOGIES
Dept C P.O. Box 26595
Austin TX 78755
512-835-6136

SPORTS COMPLEX
Football — Baseball— Golf

3 Realistic Sports Simulations— **All 3 for $30**

Football (Integer) has all the action of the real game in text. Play against the computer or your friends.

Baseball (Applesoft or Integer) uses real player stats. Manage the pros (12 teams on disk, 4 on tape) — or build your own favorites.

Golf (Applesoft or Inter) 18 holes of hi-res action for 1 to 4 players.
All fully supported. Specify tape or disk

Apple II or Apple II+

WOLFFWARE, 2004 E. Kensington, Shorewood, WI 53211

WARNING: Frequent use may cause addiction.

LABELS

2.99 perM

15/16″x3½″ white pressure
1 up - pin feed sensitive

PRICE INCLUDES SHIPPING
Packed 5M per box - Min. order 1 box - $14.95
Check with order - Mass Residents add 5% Sales Tax

CHECK-MATE™
P.O. Box 103, Randolph, MA 02368
Telephone: 617-963-7694
CALL TOLL FREE 1-800-343-7706

Scotch®
diskettes
A brand you can trust!
Reliable and dependable!

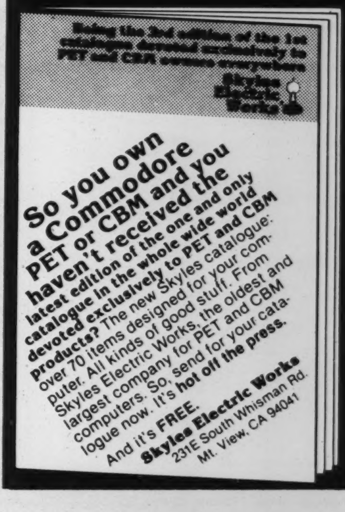
OUR PRICES HAVE NEVER BEEN LOWER!

By the box or by the case, they're ready for immediate shipment!

Call COLLECT to Order!
(805) 484-8146

QUALITY DATA SUPPLY
P.O. Box 236, Camarillo, CA 93011

Authorized Distributor
Information Processing Products
3M



So you own a Commodore PET or CBM and you haven't received the latest edition of the one and only catalogue in the whole wide world devoted exclusively to PET and CBM products? The new Skyles catalogue: over 70 items designed for your computer. All kinds of good stuff. From Skyles Electric Works, the oldest and largest company for PET and CBM computers. So, send for your catalogue now. It's **hot off the press.**

And it's **FREE.**

Skyles Electric Works
231E South Whisman Rd.
Mt. View, CA 94041

creative computing RETAIL ROSTER

A DIRECTORY OF STORES AND THE PRODUCTS THEY CARRY
TO PLACE A LISTING CALL COLLECT: LOIS PRICE (212) 725-7226

ALABAMA

VILLAGE COMPUTERS, 1720 28th Avenue South, Homewood, 35209. (205) 870-8943. Apple, Vector, Graphics, Peripherals, Software, Training and Service.

ARIZONA

PHOENIX — HEATHKIT ELECTRONIC CENTER, 2727 W. Indian School Rd. (602) 279-6247. Heath/Zenith Computers, Software, peripherals.

TUCSON — HEATHKIT ELECTRONIC CENTER, 7109 E. Broadway. (602) 885-6773. Heath/Zenith Computers, Software, Peripherals.

SIMUTEK COMPUTER PRODUCTS, 4897 East Speedway, 9881 East Skyview, Tucson, Apple, TRS-80, Xerox, Corvus, Tons of Software, Disk Drive and Printers.

DATA CONCEPTS, PHOENIX—602-242-9961, Tempe—602-968-2122, Scottsdale—602-990-3366. Atari, Apple, Franklin, NEC, Televideo, Commodore, Texas Instruments.

ARKANSAS

ABACUS — 248 Oak St., Conway 72032. (501) 329-9050. Atari, Commodore, Hewlett-Packard. Business/Personal Software, Magazines, Supplies. Free Consultation. Credit cards. We'll ship anywhere.

GAME SHOP — Ft. Smith. Computer games for TRS-80/Apple/Atari. 7 days/week.

CALIFORNIA

D.E.S. DATA EQUIPMENT SUPPLY—8315 Firestone, Downey 90241. (213) 923-9361. VICVILLE: (714) 778-5455. Commodore PET, Vic 20 specialists. Latest Software, Hardware, Books, Supplies, Peripherals in stock. In House Maintenance.

OMNI UNLIMITED; 105 S. Los Robles; Pasadena; 91101; 213-795-6664; Commodore, Zenith, Otrona, Victor, Supplies/Peripherals.

ANAHEIM—HEATHKIT ELECTRONIC CENTER, 330 E. Ball Rd. (714) 776-9420. Heath/Zenith Computers, Software, Peripherals.

CAMPBELL — HEATHKIT ELECTRONIC CENTER, 2350 S. Bascom Ave., (408) 377-8920. Heath/Zenith Computers, Software, Peripherals.

EL CERRITO — HEATHKIT ELECTRONIC CENTER, 6000 Potrero Ave., (415) 236-8870. Heath/Zenith Computers, Software, Peripherals.

LA MESA—HEATHKIT ELECTRONIC CENTER, 8363 Center Dr., (714) 461-0110. Heath/Zenith Computers, Software, Peripherals.

LOS ANGELES—HEATHKIT ELECTRONIC CENTER, 2309 S. Flower St., (213) 749-0261. Heath/Zenith Computers, Software, Peripherals.

POMONA — HEATHKIT ELECTRONIC CENTER, 1555 N. Orange Grove Ave., (714) 623-3543. Heath/Zenith Computers, Software, Peripherals.

REDWOOD CITY — HEATHKIT ELECTRONIC CENTER, 2001 Middlefield Rd., (415) 365-8155. Heath/Zenith Computers, Software, Peripherals.

SACRAMENTO—HEATHKIT ELECTRONIC CENTER, 1860 Fulton Ave., (916) 486-1575. Heath/Zenith Computers, Software, Peripherals.

WOODLAND HILLS—HEATHKIT ELECTRONIC CENTER, 22504 Ventura Blvd., (213) 883-0531. Heath/Zenith Computers, Software, Peripherals.

VANGUARD DATA SYSTEMS, 8696 South Atlantic Avenue, South Gate, 90280, 213-564-6402, Mon-Sat, North Star, Televideo, Atari/CPM Software.

COASTAL COMPUTERS, 986 Monterey, San Luis Obispo 93401 (805) 543-9339. Apple, Osborne, Alpha Micro. Software, Peripherals, Supplies. Full Service Center.

P.C. COMPUTERS, 10166 San Pablo Ave., El Cerrito 94530. (415) 527-6044. Commodore Pet, Vic 20 Specialists. In House Maintenance.

LOTUS CENTURY, Westlake Shopping Center (Inside Mini Mall), Daly City, 94015, 415-992-5230. All Major Computer lines discounted.

BEST COMPUTER STORES, INC. 1122 B Street, Hayward 94541. (415) 537-2983. Apple, Compupro, Gimix, Osborne, Otrona, Panasonic.

BYTE SHOP OF HAYWARD, 1122 B Street, Hayward 94541. (415) 537-2983. Apple, Compupro, Gimix, Osborne, Otrona, Panasonic.

PROGRAMS UNLIMITED, 11672 Ventura Blvd., Studio City, 90069. OPENING SOON.

COMPUSALES—16819 South Hawthorne Boulevard, Lawndale 90260. (213) 370-3224. IBM, Victor 9000, Basis 108, Osborne, NEC, Apple.

THE SOFTWARE AFFAIR—10127 East Rosecrans, Bellflower, 90706. (213) 866-5206. Apple/TRS-80/Atari/T.I./Color Computer Software.

COLORADO

DENVER — HEATHKIT ELECTRONIC CENTER, 5940 W. 38th Ave., (303) 422-3408. Heath/Zenith Computers, Software, Peripherals.

CONNECTICUT

COMPUTERWORKS—1439 Post Rd East, Westport 06880; (203) 255-9096. 12-6 Tues.-Fri., 12-8 Thu., 10-5 Sat.

THE COMPUTER STORE, 21 Atlantic St., Stamford, 06901. (203) 356-1920. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 683 Silas Deane Hwy, Wethersfield, 01609. (203) 563-9000. Apple, Zenith, Sanyo, Diablo, Epson

AVON — HEATHKIT ELECTRONIC CENTER, 395 W. Main St. (Rt. 44), (203) 678-0323. Heath/Zenith Computers, Software, Peripherals.

MULTI-BUSINESS COMPUTER SYSTEMS — 28 Marlborough Street, Portland, 06480, 203-342-2747, Complete Commodore Line, Hewlett-Packard, Northstar, Printers, CRT's.

COMPUTERCITY — 1475 New Britain Ave., West Hartford, 06110. (203) 521-2245. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — 377 Temple St., New Haven, 06510. (203) 562-7546. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

DELAWARE

THE COMPUTER STORE, 4010 Concord Pike, Rt. 202 North, Wilmington, 19803. (302) 478-7772, Apple, Zenith, Sanyo, Diablo, Epson.

MICRO PRODUCTS, 401 Philadelphia Pike, Wilmington, 19809, (302) 762-0227, Major brands of Hardware, Peripherals and over 75 Software lines represented.

COMPUTERLAND, ASTRO SHOPPING CENTER, Newark; (302) 738-9656. Authorized Sales/Service—IBM, Apple, Osborne, Software, Peripherals, Training.

FLORIDA

COMPUTERS 101 — 101 Hollywood Fashion Center, Hollywood, FL. 33023. (305) 981-1011. Atari, Zenith, TRS-80, NEC, Xerox, Centronics, Epson, All Printers: Sales and Service. SPANISH SOFTWARE.

HIALEAH — HEATHKIT ELECTRONIC CENTER, 4705 W. 16th Ave. (305) 823-2280. Heath/Zenith Computers, Software, Peripherals.

JACKSONVILLE — HEATHKIT ELECTRONIC CENTER, 8262 Arlington Expressway. (904) 725-4554. Heath/Zenith Computers, Software, Peripherals.

PLANTATION — HEATHKIT ELECTRONIC CENTER, 7173 W. Broward Blvd., (305) 791-7300. Heath/Zenith Computers, Software, Peripherals.

TAMPA — HEATHKIT ELECTRONIC CENTER, 4109 W. Hillsborough Ave., (813) 886-2541. Heath/Zenith Computers, Software, Peripherals.

PROGRAMS UNLIMITED, 2550 Okeechobee Blvd., West Palm Beach 33409, 305-689-1200. Hardware, Software, Peripherals, Magazines, Books. Talk to the pros today.

MICRO COMPUTER SYSTEMS, 144 South Dale Mabry Highway, Tampa 33609. (813) 875-0406, (813) 879-4301. Authorized level 1 Apple Dealer.

NEW WORLD COMPUTERS, De Sota Square, Bradenton, 33505, (813) 748-6494. Sell/Lease, in stock—XEROX, APPLE, COMMODORE, SHARP, ATARI, VECTOR GRAPHICS, OSBORNE, PANASONIC, over 1,000 pieces of software, custom programming, in house repair, HANDS ON EXPERIENCE.

SOUTHERN MICRO COMPUTER, 15945 NW 57th Avenue, Miami Lakes 33014, (305) 621-4137, Discount prices on Apple/Sanyo, Miami area's oldest dealer.

COMPUTER SYSTEM RESOURCES, INC., GAINESVILLE—Butler Plaza (904) 376-4276. Apple, Osborne, Atari, Software, Peripherals, Classes, Service.

GRICE ELECTRONICS, Fort Walton, Panama City, Pensacola, 800-342-4646. (800-874-8398). Apple, Hewlett Packard, 24 Hour Service.

MICRO COMPUTERS INTERNATIONAL, 1688 and 2420 Coral Way, Miami 33145, 305-856-5166. VIC-20, Atari, Apple, Zenith, Altos, Xerox, Sanyo, NEC, Okidata, Epson. 10 to 25% Discount on all personal computers and software.

GEORGIA

ATLANTA — HEATHKIT ELECTRONIC CENTER, 5285 Roswell Rd., (404) 252-4341. Heath/Zenith Computers, Software, Peripherals.

MENTOR TECHNOLOGY, 3957 Pleasantdale Road, Atlanta, 30340, 404-447-6236. Atari, Televideo, Sanyo, Altos, C. ITOH Printers and other CP/M Systems.

ILLINOIS

COMPUTERLAND/DOWNERS GROVE — 136 Ogden Ave., Downers Plaza 60515; (312) 964-7762. 10-6 Mon.-Sat., 10-8 Tue., Thurs. Apple, Atari, Osborne, Xerox, IBM Personal Computer, Fortune.

FARNSWORTH COMPUTER CENTER — 1891 N. Farnsworth Ave., Aurora 60505; (312) 851-3888. 10-8 Mon.-Fri., 10-5 Sat. Apple, Hewlett-Packard series 80 systems, HP Calculators, IDS Printers.

LIBERTYVILLE VIDEO AND COMPUTER CENTER; 872 So. Milwaukee Ave; LIBERTYVILLE; 312-367-8660; open 7 days; Atari Computers, Hardware/Software.

THE COMPUTER ROOM, 638 North Michigan, Chicago, IL. 60611. (312) 337-6744. Apple, Televideo, Osborne. Business Program Specialists.

COMPUTER JUNCTION—543 S. York Rd., Elmhurst 60126. (312) 530-1125. Strong support on Apple, Atari, Xerox, NEC. Software/Hardware.

VIDEO ETC., 465 Lake Cook Plaza, Deerfield, 60015, (312) 498-9669. Other locations: SKOKIE (312) 675-3655, Orland Park (312) 460-8980, Buffalo Grove, (312) 459-6677, strong Hard/Software support for Apple, Atari.

DATA DOMAIN OF SCHAUMBURG, 1612 E. Algonquin Rd., Schaumburg, 60195. (312) 397-8700. 12-9 Mon.-Fri., 10-5 Sat. Apple, Alpha Micro, Osborne, Hewlett-Packard calculators. Largest book and Magazine selection.

COMPUTERS ETC. 2515 West 147th Place, Posen 60469. (South Suburbs of Chicago). Apple, Zenith Hardware/Software/Service. Complete Learning Center.

LOMBARD—COMPLETE COMPUTING—890 E. Roosevelt. (312) 620-0808: Apple, Atari, NEC, Altos, Dynabyte; Software, Peripherals, Classes.

COMPUTERLAND/LAKE COUNTY—Rtes 45 & 60, Mundelein—(312) 949-1300: IBM, Apple, Osborne, Altos, Fortune, Digital: 150 other manufacturers.

NILES—COMPUTERLAND—9511 N. Milwaukee Ave. 60646. (312) 967-1714: Apple, IBM Personal, Cromemco, Fortune, Osborne, Otrona: Software.

COMPUTERLAND/NORTHBROOK—3069 Dundee Road (60062). (312) 272-4703: IBM, Apple, Atari, Osborne, Altos, Vector: Software, Peripherals, Service.

COMPUTERLAND/OAK LAWN—10935 S. Cicero, Oak Lawn 60453; (312) 422-8080; IBM-PC, Apple, Atari, Osborne, Corvus, Dynabyte: Software, Peripherals.

ATARI SERVICE—Computers/Videogames, TRS-80, upgrades by appointment—Electronic Service, Route 150, Mansfield, 61854: (217) 489-3241.

HEATHKIT ELECTRONIC CENTERS—3462-66 W. Devon Ave., Chicago 60645 (312) 679-2270—224 Ogden Avenue, Downer's Grove 60515, (312) 852-1304—Heath/Zenith Computers, Software, Peripherals.

GALESBURG—MIDWEST INFORMATION SYSTEMS. 41 South Cherry 61401. (309) 342-7177. Apple, VIC-20, Peripherals, Software. Open 6 days.

THE SOFTWARE STORE—GLENVIEW—1767 Glenview Road, 60025, (312) 724-7730. Popular Micro Computer Software. Special Orders Specialists.

MAIN STREET COMPUTER—215 North Main, Decatur 62523. (217) 429-5505/1610 Broadway, Mattoon 61938. (217) 234-4404/313 East Monroe, Springfield 62701. (217) 753-8808/123 West Main, Taylorville 62568. (217) 824-4984. Apples, Hewlett-Packard Calculators, large stock of business, personal Software. Repairs.

MICRO COMPUTERS PLUS—349 East Main, Galesburg 61401. (309) 342-9572. All Systems/Home, Business. Classes, Service, Books.

ABC COMPUTER—SKOKIE—3361 Dempster, 60076. (312) 673-3550. Gamemaster, Telecommunication Experts. Business/Personal Computers. Software, Supplies, Service.

ABC COMPUTER—OAK LAWN 60076, 9010 Cicero (312) 423-2800. Gamemaster, Telecommunication experts. Business/Personal Computers. Software, Supplies, Service.

COMPUTERLAND/ARLINGTON HEIGHTS—270 West Rand Road, 60004. (312) 870-7500. Apple, IBM, Altos, Fortune, Xerox, DEC. Peripherals.

ALPINE COMPUTER CENTER—ROCKFORD—2418 S. Alpine, 61108. (815) 229-0200. Apple, Cromemco, Olivetti, OSI, VIC, Corvus, Peripherals.

IOWA

BEACON MICRO CENTER, 213 Lincoln Way, Ames 50010. (515) 233-4807. Apple, Atari, Nec Computers, Peripherals, Software, Service.

KANSAS

GAME SHOP — Wichita. Computer games for TRS-80/Apple/Atari. 7 days/week.

MISSION—HEATHKIT ELECTRONIC CENTER, 5960 Lamar Avenue; (913) 362-4486 Heath/Zenith Computers, Software, Peripherals, Service.

WICHITA—CUSTOM SYSTEMS DEVELOPMENT—114 Pattie 67211, (316) 262-1415. Ohio Scientific, Altos, SD Systems, CPM Software. Service.

KENTUCKY

LOUISVILLE—HEATHKIT ELECTRONIC CENTER—12401 Shelbyville Road, 40243. (502) 245-7811. Heath/Zenith Computers, Diablo Printers, Software, Peripherals.

LOUISIANA

THE COMPUTER PEOPLE—Apple, NEC, Osborne, Corvus Concept—Seminars, Sales, Service. Houma, Morgan City, Lafayette—1-800-352-5828.

COMPUTERLAND/LOUISIANA—312 St. Charles, New Orleans 70130. (504) 522-2255. IBM, Apple, Osborne, Fortune, Vector. #1 in service.

MARYLAND

COMPUTERS, ETC...13A Allegheny Ave., Towson, 21204. (301) 296-0520; 9330 Georgia Ave., Silver Spring, 20910. (301) 588-3748, 257 West St., Annapolis 21401. (301) 268-6505. Apple, Cromemco, Osborne, Northstar, Seequa. Sales/Service/training.

BASIK COMPUTERS INC. 307 North Frederick Avenue, Gaithersburg, 20877, (301) 840-0412, all Hardware/Software compatible with Apple, at discounts.

BALTIMORE—HEATHKIT ELECTRONIC CENTER, 1713 E. Joppa Rd., (301) 661-4446. Heath/Zenith Computers, Software, Peripherals.

ROCKVILLE — HEATHKIT ELECTRONIC CENTER, 5542 Nicholson Lane. (301) 881-5420. Heath/Zenith Computers, Software, Peripherals.

BETHESDA COMPUTERS—8020 Norfolk Ave., Bethesda 20814. (301) 657-1992. Apple Hardware/Software—Sales/Service/Peripherals and Accessories.

OLNEY COMPUTERS, 3414 First Ave., Oleny 20832. Discount prices on Atari, NEC, Epson, Okidata, Commodore, Amdek.

MASSACHUSETTS

SCIENCE FANTASY BOOKSTORE — 18 Eliot St., Harvard Sq., Cambridge 02138; (617) 547-5917. 11-6 Monday-Saturday till 8 Thursday. Apple, Atari, IBM and TRS-80 games.

THE COMPUTER STORE, 120 Cambridge St., Burlington, 01803 (617) 272-8770. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 1678 Mass. Ave. Cambridge, 02138. (617) 354-4599. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 680 Worcester Rd, Framingham, Massachusetts 01701. (617) 879-3720. Apple, Zenith; Sanyo, Diablo, Epson.

THE COMPUTER STORE, 103 Devonshire St., Boston, 02109. (617) 426-4385. Apple, Zenith, Sanyo, Diablo, Epson.

PEABODY — HEATHKIT ELECTRONIC CENTER, 242 Andover St. (617) 531-9330. Heath/Zenith Computers, Software, Peripherals.

WELLESLEY — HEATHKIT ELECTRONIC CENTER, 165 Worchester Ave. (617) 237-1510. Heath/Zenith Computers, Software, Peripherals.

COMPUTERCITY—16 Front Street, Worcester, 01608. (617) 755-5464. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — Vinebrook Plaza, Burlington, 01803. (617) 273-3146. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — 420 Rutherford Ave., Charlestown, 02129. (617) 242-3350. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — Hanover Mall Plaza, Hanover, 02339. (617) 826-9217. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — 991 Mass. Ave., Cambridge, 02138. (617) 491-4638. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY—151 Endicott St., Danvers, 01923. (617) 774-7118. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY—50 Worcester Rd., Framingham, 01701. (617) 875-8126. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

THE GAME SHOP—ACTON, 166 Great Road (01720): (617) 263-0418. N.E.'s largest selection of Game/Recreational Software.

BURLINGTON/SOFT SUPPLY INC.—68 Middlesex Tpk., 01803; (617) 229-6666. Supporting IBM, NEC, Digital, Apple Microcomputers.

HOME ENTERTAINMENT SHOWPLACE—757 Belmont, Brockton, 02401. (617) 588-1643. Atari, Commodore, Peripherals. Game/Business Software. Call now!

BRAINTREE—J.L. HAMMETT. Hammett Place 02184, (617) 848-1000. South Shore Plaza Store (617) 848-1000. Apple, all educational software, books.

MICHIGAN

COMPUTER CENTER — Garden City; (313) 425-2470 & West Bloomfield; (313) 855-4220; Hewlett-Packard Computers/Calculators, Apple, North Star. Large Selection of Software/Hardware.

COMPUTER CONTACT—3017 East Hill, Grand Blanc 48439. (313) 694-3740. Apple, Altos. Software, Peripherals, Service. Business/Education/Personal.

DETROIT—HEATHKIT ELECTRONIC—E. Detroit 48021: 18149 E. Eight Mile (313) 772-0416—Detroit: 18645 W. Eight Mile (313) 535-6480.

MINNESOTA

ABS DATASYSTEMS CORP. — 905 St. Germain, St. Cloud 56301. (612) 253-8734. Ohio Scientific, M/A COM O.S.I., Authorized Distributor.

DIGITAL DESIGNS—ROCHESTER—Barlow Plaza, (507) 282-3222. Altos, Apple, Software, Peripherals. Service and Training.

ST. PAUL—HEATHKIT ELECTRONIC CENTER—1645 White Bear, (612) 778-1211. Heath/Zenith Computers, Software, Peripherals.

MISSISSIPPI

MISSISSIPPI MICROS, Mart 51, 1700 Terry Road, Jackson, 39204, (601) 948-7846, Apple, Commodore, Atari, Cromenco, Sales and Service.

MISSOURI

CENTURY NEXT COMPUTERS — 1001 E. Walnut, Columbia, 65201; 314-875-8613/2120 Missouri Blvd., Jefferson City, 65101; 314-636-6502 — Apple, Osborne, Atari.

COMPUTER MART — 1904-B E. Meadowmere, Springfield, 65804, 417-862-6500. Apple, Commodore, IMS International, Software, complete Computer Bookstore, Business Specialist.

BRIDGETON/ST. LOUIS HEATHKIT ELECTRONIC CENTER—3794 McKelvey Road, 63044—(314) 291-1850: Heath/Zenith Computers: Software, Peripherals, Support.

COMPUTER ANNEX—411 South Campbell, Springfield 65806. (417) 864-7036. Black Apple Sales, Service, Supplies. We're education specialists.

ST. LOUIS—FORSYTHE COMPUTERS—7748 Forsyth Blvd., Clayton 63105. (314) 721-4300. Apple Dealer. Best in sales, Service, support.

MONTANA

THE COMPUTER STORE—BILLINGS—1216 16th Street, 59102. (406) 245-0092: Apple, Commodore, Hewlett/Packard: Software, Perpherals, Service.

NEVADA

HOME COMPUTERS — 1775 E. Tropicana #6, Las Vegas 89109; (702) 798-1022. Mon.-Sat. 10-7 Apple, Atari, Hardware/Software, Books & Service.

NEW HAMPSHIRE

COMPUTER MART OF NEW HAMPSHIRE, 170 Main St., Nashua, 03060. (603) 883-2386. THE Apple Specialists. Full line Hardware/Software. Training Service.

COMPUTERCITY — 527 South Broadway, Salem, 03079. (603) 898-2390. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — 1525 South Willow St., Manchester, 03103. (603) 668-9527. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPU-CRAFT. 11 Dunbar Street, Keene 03431. (603) 357-3901. Commodore, Altos, Software. Buy right for education/business.

NEW JERSEY

THE COMPUTER UNIVERSE — 155 Route 17S., Paramus 07652; (201) 262-0960. Mon; Wed; Fri., and Sat., 10-6. Tues., and Thurs; 12-9. 23 Rt. 206, Stanhope 07874 (201) 347-7892 Tues. & Thurs. 12-9; Wed., Fri. & Sat. 10-6. Specializing in Apple Computers.

SOFTWARE CITY, PINE BROOK — 101 Rt. 46 East, 07058; (201) 575-4574. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

STONEHENGE COMPUTER CORP., 89 Summit Ave., Summit 07901. (201) 277-1020. 10-6 M.-F., 10-5 Sat. Apple, Canon, Wicat. Authorized Dealer. Sales and Service.

COMPUTERLAND, 35 Plaza, Rt. 4 West, Paramus, 07652. (201) 845-9303. Apple, IBM, Vector Graphic, etc. We know small computers.

COMPUTERS, ETC...Plaza 38 Center, Rt. 38, Cherry Hill, 08002. (609) 779-0023. Apple, Cromemco, Osborne, Northstar, Seequa. Sales/Service/Training.

SOFTWARE CITY, TEANECK — 161 Cedar Lane, 07666. (201) 692-8298. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

SOFTWARE CITY, GREENBROOK — 60 Route 22 West, 08812. (201) 968-7224. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

ASBURY PARK—HEATHKIT ELECTRONIC CENTER, 1013 State Hwy. 35; (201) 775-1231. Heath/Zenith Computers, Software, Peripherals.

FAIR LAWN — HEATHKIT ELECTRONIC CENTER, 35-07 Broadway (Rt. 4), (201) 791-6935. Heath/Zenith Computers, Software, Peripherals.

COMPUTERLAND OF CHERRY HILL — Pine Tree Plaza, 1442 E. Rt. 70, Cherry Hill 08034. (609) 795-5900. Apple, IBM, Fortune.

SOFTWARE MART — 352 Bloomfield Avenue, Caldwell 07006, 201-228-4949. Software for Apple, Atari, TRS-80, Pet. 10-20% off list.

SOFTWARE CITY/SUMMIT — 3 Beechwood Rd., 07901. (201) 273-7904. Bus/Res/Utility/Home programs for most microcomputers. Up to 20% off List.

WAYNE SOFTWARE, 1459 Route 23, Wayne Tile Center, Wayne 07470, across from Packanack Center. Computers. Programs. Books. Peripherals. Discount Prices. 201-628-7318.

SOFTWARE CITY/FAIRVIEW—251 Broad Ave., 07022. (201) 943-9444. Bus/Rec/Utility/Home Programs for most Microcomputers. Up to 20% off list.

SOFTWARE ASYLUM, INC.—Rt. 9 South, Box 175, Old Bridge 08857. (201) 536-1401. Huge Selection for Atari—over 400 Programs available. Call for our catalog.

SOFTWARE ASYLUM, INC. 626 Roosevelt Ave., Carteret. 07008. (201) 969-1900. Huge selection for Atari—over 400 programs available. Call for our catalog.

NEW MEXICO

OMEGA COMPUTER CONNECTION, 8244 Menaul N.E., Hoffmantown Shopping Center, Albuquerque, 87110, (505) 298-5400. Commodore VIC 20 and Victor 9000.

NEW YORK

SOFTWARE CITY, ARMONK—146 Bedford Rd, 10504. (914) 273-3677. Bus/Rec/Utility Home programs for most microcomputers. Up to 20% off list.

UPSTATE COMPUTER SHOP—RD 1, Box 17A, Whitesboro 13492; (315) 768-8151. 10-6 Mon.-Fri., 11-5 Sat. Apple — Commodore — Data General.

UPSTATE COMPUTER SHOP, 1823 Western Avenue, Albany 12203; (518) 456-3019. Commodore/VIC 20 Specialists.

ADVANCED COMPUTER SYSTEMS, 18 Market St., Potsdam, 13676. (315) 265-5620. Apple, Commodore, O.S.I. and Novell Data Systems.

CASTLE COMPUTERS, 720 New Loudon Rd., Latham, 12110. (518) 783-9405. M-F: 10-6, Sat: 12-5. Apple, Atari Hardware/Software.

COMPUTER WORLD—4254 N. Buffalo Rd., Orchard Park, 14127. (716) 662-4141. M-F: 9-9, Sat: 9-5. Atari Hardware/Software.

FUTURE VISIONS COMPUTER STORE, 70 Broad Hollow Rd., Rt. 110, Long Island, 11747. (516) 423-7820. Apple, Osborne, Northstar, Ithaca Intersystems.

CLASSIFIED ADVERTISING ORDER FORM

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15 (MINIMUM)
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30

Please refer to heading on first page of this section for ad placement information:

REGULAR: $2.00

# OF WORDS ____________ # OF INSERTIONS ____________

☐ PAYMENT ENCLOSED $ ____________

☐ CHARGE: You will be billed monthly. ☐ American Express ☐ Diners ☐ Visa ☐ MasterCharge-Interbank # ____________

Account # ____________ Exp. Date ____________

SIGNATURE ____________

PRINT NAME ____________

ADDRESS ____________

CITY ____________ STATE ____________ ZIP ____________ CC1182

THE COMPUTER STORE, 221 East Post Rd., White Plains, 10601. (914) 428-1661. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 40 East 52nd St. N.Y.C. 10022. (212) 832-2180. Apple, Zenith, Sanyo, Diablo, Epson.

SOFTWARE CITY, PEARL RIVER—147 Kinderkamack Rd., Montvale 07645. (201) 391-0931. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

AMHERST — HEATHKIT ELECTRONIC CENTER, 3476 Sheridan Drive., (716) 835-3090. Heath/Zenith Computers, Software, Peripherals.

JERICHO, L.I. — HEATHKIT ELECTRONIC CENTER, 15 Jericho Turnpike, (516) 334-8181. Heath/Zenith Computers, Software, Peripherals.

ROCHESTER — HEATHKIT ELECTRONIC CENTER, 937 Jefferson Rd., (716) 424-2560. Heath/Zenith Computers, Software, Peripherals.

N. WHITE PLAINS—HEATHKIT ELECTRONIC CENTER, 7 Reservoir Rd., (914) 761-7690. Heath/Zenith Computers, Software, Peripherals.

ADS OFFICE SYSTEMS, BOX 3210, Rt. 55, Poughkeepsie 12603. (914) 473-9400. User support: Apple, Hewlett-Packard, IBM-PC.

PROGRAMS UNLIMITED, 20A Jericho Turnpike, Jericho, Long Island 11753. (516) 333-2266. Hardware, Software, Peripherals, Magazines, Books. Talk to the pros today.

PROGRAMS UNLIMITED, Smith Haven Plaza, (Route 347) Smith Haven, Long Island 11755. (516) 724-4490. Hardware, Software, Peripherals, Books. Talk to the pros today.

PROGRAMS UNLIMITED, 131 Mamaroneck Avenue, White Plains 10601, (914) 761-9283. Hardware, Software, Peripherals, Magazines, Books. Talk to the pros today.

SOFTWORLD DISCOUNTS, 2412 Kayron Lane, North Bellmore, 11710, 516-826-6371, Apple, Atari, TRS-80, Software Discounted. Call M-F, 4-10.

BUSINESS COMPUTING INTERNATIONAL—342 Madison, NYC 10173. (212) 697-9400. Specialization Export: Archives, Wicat, IBM Series I, System 23 Datamaster, Arabic Conversion Packages, All Software.

NORTH CAROLINA

GREENSBORO — HEATHKIT ELECTRONIC CENTER, 4620 W. Market Street, (919) 299-5390. Heath/Zenith Computers, Software, Peripherals.

PERSONAL COMPUTER CENTER, 2605 Chapel Hill Boulevard, Durham 27707, 919-493-5466, Raleigh 919-833-2240. Full Line of Apple Hardware/Software for Business, Education & Life.

COMPUTER & VIDEO CENTEF — 1902 Clarendon Blvd., New Bern 28560. (919) 638-5030. Atari, Northstar, Altos. Specializing in Small Business Systems.

ALPHA-ONE COMPUTER AND CAMERA CENTER. Highpoint 27260. (919) 883-4013. Atari, NEC, Epson Authorized factory Service Center.

OHIO

ABACUS II — 1417 Bernath Pkwy., Toledo 43615; (419) 865-1009. 4751 Monroe St. (419) 471-0082. 10-6, 10-7 Thurs. Apple, Osborne, Adds, NEC, Atari, Epson & IDS Printers.

NORTH COAST COMPUTERS — 626 Dover Center, Bay Village 44140; (216) 835-4345. 10-6 Mon.-Sat., 10-8 Tue., Thur. Apple/Atari/Vector Graphic/Data General.

PROGRAMS UNLIMITED, Golden Gate Plaza, Mayfield Heights, 44124. OPENING SOON!

MICRO CONCEPTS, 1655 Brittain Road, Akron, 44310, (216) 633-7740. Commodore, Atari, Onyx, Northstar. Full Service dealer, Classes, Custom Programming.

MICRO LOGIC, 2322 Bethel-Maple Road, Hammersville, 45130, (513) 735-3047, Commodore specialist with Business Models and APF Computers.

BARNHART STORES — 548 N. Main, Urbana 43078. (513) 653-7257. 8AM-5PM. Atari/Commodore at discount prices.

OKLAHOMA

OKLAHOMA CITY — HEATHKIT ELECTRONIC CENTER, 2727 Northwest Expressway. (405) 848-7593. Heath/Zenith Computers, Software, Peripherals.

GAME SHOP — Norman, Stillwater, Oklahoma City, Tulsa. Computer games for TRS-80/Apple/Atari. 7 days/week.

TULSA—ABS COMPUTER CENTER—8518-E East 71st (74133), (918) 252-1604: Atari, Apple, Hewlett-Packard. Software, Peripherals, Training.

SYSTEMS PLUS—3407 South Boulevard, Oklahoma City, 73034. (405) 348-0862. NEC business applications, Atari, VIC-20, Peripherals for IBM.

ENID—Specialty Electronics (405) 233-1632. Atari, Commodore, Texas Instruments. All Software/Business Applications. Open 6 days/week.

OREGON

MICRO COMPUTER SUPPLIES, INC. 3809 Southwest Hall, Beaverton, 97005. (503) 643-0865. Kaycomp-2, Televideo, Xerox, Diablo, Dysan, 3M. Ribbons, Forms, Software.

THE COMPUTER STORE—2015 Northwest Circle Boulevard, Corvallis 97330. (503) 754-0811. Microcomputers/Peripherals sales and service. Training.

MAIL ORDER—COMPUTEROLA—P.O. Box 13748, Portland, 92713. (503) 239-4315. Atari, VIC-20, Epson, Okidata, Hayes. Software, Peripherals.

PENNSYLVANIA

CALDWELL COMPUTER CORP., 6720 Rising Sun Ave. Philadelphia 19111. (215) 742-8900. Apple, Commodore, Percom, Northstar Sales/Service.

COMPUTERLAND/HARRISBURG, 4644 Carlisle Pike, Mechanicsburg, 17055. (717) 763-1116. Apple, IBM, Xerox, Zenith. Sales, support and training.

ERIE COMPUTER CO., 2131 W. 8th St., Erie, 16505. (814) 454-7652. Apple, Commodore, OSI, Xerox, Atari, Huge inventory of Software.

MARKETLINE SYSTEMS INC., 2337 Philmont Avenue, Huntington Valley, 19006, (215) 947-6670. We sell and service MicroComputers and Peripherals for small business and industry.

STARGATE ENTERPRISES, 1111 Fifth Avenue, McKeesport, 15132, (412) 664-1111, hours: 10-6/Monday-Saturday. Authorized Atari dealer with Atari Information Center.

INTEGRATED MICRO COMPUTER SERVICE, 168 Madison, Rochester 15074, (412) 728-6331, authorized dealer of Atari, also selling Televideo, Quasar, Casio.

THE COMPUTER STORE, THE Philadelphia Center Hotel, Philadelphia, PA. 19103. (215) 567-6475. Apple, Zenith, Sanyo, Diablo, Epson.

20/20 COMPUTER, 2020 Hamilton Street, Allentown, 18104, (215) 439-1800. Atari, Apple, Durango, Hewlett-Packard, Data General, Zenith, Televideo. Hardware/Software and Peripherals.

PHILADELPHIA — HEATHKIT ELECTRONIC CENTER, 6318 Roosevelt Blvd. (215) 288-0180. Heath/Zenith Computers, Software, Peripherals.

FRAZER — HEATHKIT ELECTRONIC CENTER, 630 Lancaster Pike, (Rt. 30) (215) 647-5555. Heath/Zenith Computers, Software, Peripherals.

PITTSBURGH — HEATHKIT ELECTRONIC CENTER, 3482 Wm. Penn. Hwy. (412) 824-3564. Heath/Zenith Computers, Software, Peripherals.

COMPUTER FORUM—490 Lancaster Pike, Frazer, 19355. (215) 296-3474. Commodore/Altos/Atari—Hardware/Software; Epson. Service/Training.

CAMERART, The Court at King of Prussia, King of Prussia, 19406, (215) 337-2020. CAMERART, opening August 1982, Willow Grove Center, 2500 Moreland Road, Willow Grove, 19090, (215) 657-7272. Apple/Texas Instruments. Sales/Service. For Business Systems Call: (215) 544-8700.

PERSONAL SOFTWARE, 146 Paoli Pike, Paoli, 19355, 215-296-2726. SOFTWARE SPECIALISTS. Custom Programs, Canned Programs and Peripherals.

YORK—COMPUTERS UNLIMITED—2813 E. Prospect Road (17402), (717) 755-1045: Apple, IDS, VIC: Software, Peripherals—Full Service.

THE TOY STORE, 104 Washington Road, Donaldson's Crossroads, 15317, 412-941-5466. Whatever is available for the Atari 400/800, VIC-20, Texas Instruments. 99 Hardware/Software is Here!

RHODE ISLAND

THE COMPUTER STORE, 740 North Main, Providence 02904. (401) 331-0220. Apple, Zenith, Sanyo, Diablo, Epson.

WARWICK — HEATHKIT ELECTRONIC CENTER, 558 Greenwich Ave. (401) 738-5150.

COMPUTERCITY — 165 Angell St., Providence, 02903. (403) 331-2187. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

SOUTH DAKOTA

COMPUTER SYSTEMS DESIGN—2139 Jackson Blvd., Rapid City, 57701. (605) 341-3662. Apple, Vector Graphics. Custom Software. Restaurant Management!

TENNESSEE

VIDEO VISION STORE, 1645 Downtown West Blvd., Suite #3, #4, Knoxville 37919, 615-690-8800, Atari 400/800, Hardware/Software.

UTAH

MIDVALE —HEATHKIT ELECTRONIC CENTER, 58 East 7200 South. (801) 566-4626. Heath/Zenith Computers, Software, Peripherals.

VIRGINIA

COMPUTERS, ETC...6671 Backlick Rd., Springfield, 22150. (703) 644-5500. Apple, Cromemco, Osborne, Northstar, Seequa. Sales/Service/Training.

THE COMPUTER STORE, 6858 Old Dominion Drive, McLean, 22101. (703) 821-8333. Apple, Zenith, Sanyo, Diablo, Epson.

ALEXANDRIA — HEATHKIT ELECTRONIC CENTER, 6201 Richmond Hwy., (703) 765-5515. Heath/Zenith Computers, Software, Peripherals.

VIRGINIA BEACH — HEATHKIT ELECTRONIC CENTER, 1055 Independence Blvd. (804) 460-0997. Heath/Zenith Computers, Software, Peripherals.

SMALL BUSINESS COMPUTER CENTER, 2929 Virginia Beach Boulevard, Virginia Beach, 23452, 804-340-1977. Apple, Vectorgraphics, Alpha Micro, Commodore VIC 20.

ODYSSEY DATA PRODUCTS—9014 West Broad Street Road, Richmond, 23229. (804) 270-1992. Discount Software-Hardware-Peripherals for Apple, Atari, IBM, TRS-80, Xerox 820. Free Mail Order Catalogue.

WASHINGTON, DC

STARWARE*, Suite 551, 1629 K Street Northwest 20006; (202) 337-5300; everything for the IBM/Software, Hard Discs, Color Printers, Modems, etc...

THE COMPUTER STORE, 1990 K Street N.W., Washington, D.C. 20006. (202) 466-3367. Apple, Zenith, Sanyo, Diablo, Epson.

WASHINGTON

SEATTLE — HEATHKIT ELECTRONIC CENTER, 505 8th Ave., N. (206) 682-2172. Heath/Zenith Computers, Software, Peripherals.

TUKWILA — HEATHKIT ELECTRONIC CENTER, 15439 53rd Ave., S. (206) 246-5358. Heath/Zenith Computers, Software, Peripherals.

VANCOUVER — HEATHKIT ELECTRONIC CENTER, 516 S.E. Chaklov Dr., (206) 254-4441. Heath/Zenith Computers, Software, Peripherals.

CENTRALIA—DSC COMPANY. 119 West Magnolia 98531. (206) 736-3240. Atari, Commodore, Helix/6809. Services, Consulting, and supplies.

TACOMA—ELECTRONICS SHOWROOM. 2504 Jefferson Avenue, 98402. (206) 272-2329. Atari/VIC Computers. Atari/Apple/TRS-80/Commodore Software. Supplies.

KENT VIDEO AND COMPUTERS—1415 West Meeker 98031. (206) 854-7629. Atari/Kaycomp-2/Commodore. Printers/Modems/Software/Books.

YAKIMA—ROB ROY COMPUTER SHOP—1109 West Yakima Avenue 98902. (509) 575-7704. Northstar, Atari, Software, Peripherals, Magazines.

ELLENSBURG—COMPUTERCRAFT. 115 West 4th 98926. (509) 925-3755. Popular Software/Hardware, Business/Personal. Books/Magazines. Classes. Services.

KIRKLAND—USS ENTERPRISE, 12091 124th Avenue NE 98033. (206) 821-5353. Game Software. Atari, Intellivision, Odyssey, Astrocade, Coleco.

ELECTRONIC SUPER MART—Parkway Plaza 98188, (206) 575-1093/3070 Kitsap Way, Bremerton 98310, (206) 377-3979. Commodore Business Machines. Parts.

WEST VIRGINIA

COMPUTERS PLUS, INC., 300 D Street, Southvenue 98902. (509) 575-7704. Northstar, Atari, Software, Peripherals, Magazines.

WISCONSIN

COMPUTERLAND/MADISON/6625 Odana Rd., 53719, (608) 273-2020; 3205 E.Washington, 53704 (608) 241-2100. Apple, Osborne, IBM-PC, Xerox, Hewlett-Packard, Fortune.

COLORTRON COMPUTERS, 2111 Lathrop Ave., Racine, 53405. (414) 637-2003. Apple, Hardware and Software, C. ITOH Printers. Service/Training.

BLUE LAKES COMPUTING—Apple, Fortune, Osborne, Sony—Software, Service, Supplies—Madison (608) 233-6502—Brookfield/Waukesha (414) 785-1788—Maxell Diskettes $1.49, limit 3 per customer with coupon.

MILWAUKEE—COMPCO-7110 W. Fond-Du-Lac, 53218, (414) 438-0610: Apple, Altos, DEC, Osborne, Software, Peripherals, Service, Custom Programming.

MAGIC LANTERN—406 South Park Street, Madison 53715. (608) 251-9112. All Atari Products. 500 Programs in stock.

PHOTOART VISUAL SERVICE—840 North Plankinton, Milwaukee 53203. (414) 271-2270. Bell & Howell, Apple. Educational/Industrial Software.

creative computing CLASSIFIED

CLASSIFIED RATES: Per Word, 15 Word Minimum. **REGULAR:** $2.00. **EXPAND-AD®:** $3.00. Ads set in all bold type at 20% premium. Ads set with background screen @ 25% premium. **GENERAL INFORMATION:** Prepayment discounts available. Payment must accompany order except credit card—Am. Ex., Diners, MC, VISA (include exp. date)—or accredited ad agency insertions. Copy subject to publisher's approval; must be typewritten or printed. First word set in caps. Advertisers using P.O. Boxes MUST supply permanent address and telephone number. Orders not acknowledged. They will appear in next available issue after receipt. Closing date: 5th of the 3rd month preceding cover date (e.g., April issue closes Jan. 5th). Send order & remittance to: Classified Advertising, CREATIVE COMPUTING Magazine, 1 Park Avenue, New York, N.Y. 10016. Direct inquiries to Candi Huggins, (212) 725-3927.

SOFTWARE

RETIREMENT PLANNING—$29.95 for Atari. Advanced financial planning, 20922 Paseo Olma, El Toro, CA. 92630.

VIC-20 EDUCATIONAL Software designed by teachers, tested by kids. Free catalog. ATHENA SOFTWARE, 727 Swarthmore Dr., Newark, DE 19711.

FLABFIXER™ IS HERE! Amazing TRS-80 (PC-1) Sharp (PC1211) POCKET Software. Computes ideal weight, % body fat, GRAPHS daily caloric output and MUCH more. It's the ideal "health helper"! Easy to use guide included. Send $14.95 plus $1.00 handling to: HI-PER Guides, 20 Allison Rd. Newport News, VA 23602.

STOP!!! Paying too much for software? Swap software with others nationwide. Join computer pen pals. Send $5. and list of your hardware/software to: Bresnahan, 1201 Seminole Blvd., Suite 175, Largo, FL 33540.

CHECK FILE Personal Checking/Cash Management System for the Apple II/Apple II Plus. Data Base Management of checks/cash. $19.95. ARCON, 2067 Devon Lane, Erie, PA. 16509.

ONLY $9.95! 100 Easy Input Business and Graphic Programs for all MICRO COMPUTERS using basic. MURPHY & ASSOCIATES, P.O. Box 165, Brandon, Mississippi 39042. (601) 939-9500.

PLAYER/MISSILE TOOL KIT for Atari 400/800. (16K) Create exciting, fast-action graphics using straight forward BASIC. Kit facilitates rapid horizontal and vertical movement, collision detection and player creation. Demo program and complete documentation. Indispensable for game development. $29.95 cassette. Sound Software, P.O. Box 16663, Seattle, WA 98116.

SCOTCH BRAND——a full line of quality personal computing supplies. Diskettes & cassettes for most systems. Educational specialists. Computing Services, 62 Idlewild Rd., Levittown, PA 19057. Free Data!

"CONSUMER" DRUG WATCHER——New Educational Programs for the informative use of 550 medications. Drug Information Program, and Drug Testing Program that tests your specific medications for potential 'Drug Interactions'. Applesoft/disk/48K $39.95. Medical Watch Software, 1620 Ensenada, Modesto, California 95355.

KISS-MONEY MAKING PROJECT via computer dating for schools, clubs. MICROSOFT BASIC listing, documentation, sample surveys for $7. DJ Bohlke, Coggon, IA 52218.

SCHOOL PROGRAMS——Not CAI! For educators—Registration, Parent Reports, List Generator, Composition Correction, Golf League Statistics, Etc. Applesoft. Write for catalog. DISK DEPOT, 731 WEST COLORADO, COLORADO SPRINGS, CO 80905.

POPULAR BUSINESS/UTILITY SOFTWARE AT DISCOUNTS! For Atari, Apple, IBMPC, TRS-80. Write: SoftQuest, P.O. Box 9663, Baltimore, MD. 21237. (301) 866-1665.

QUEUE OFFERS THE LARGEST selection of educational Software available anywhere. Specify Apple, PET, TRS-80. Catalogue $8.95—apply against first order. QUEUE, 5 Chapel Hill Drive, Fairfield, CT 06432.

OPTION-INVESTING PROGRAM MAXIMIZES PROFIT. For Apple, TRS-80, IBM, $125. Free Brochure. OPTIONS-80, Box 471-C, Concord, MA 01742.

SINCLAIR ZX81/TS-1000/TRS-80 COLOR COMPUTER PROGRAMS. Wide Selection/High Quality. Catalog $1.00. Zeta Software, Box 3522, Greenville, SC 29608.

ZX81 PROGRAM PAKS: Personal, Physics, Electronics $9.95 Each. Send Check, M.O. to Sikes Software, Box 115, Edmeston, NY 13335.

COMPUTER CONSULTANT

SPACE CITY SOFTWARE——Business System/Software Consulting, Design, Programming, Training, Support. CP/M Specialist. Houston (713) 465-3131.

COMPUTER EQUIPMENT/SUPPLIES

OPTICAL COMMUNICATOR or Data Link receiver, Transmitter; all electrical parts, lenses, instructions, $9.95 each. Both $18.50. $1.00 postage/handling Specify digital or analog. Peko, Box 5476, Sherman Oaks, CA 91413.

ELEPHANT FLOPPY DISKS 5"/8"——(10/Box)—5" SSSD/soft $21.96, $20.96/2+; SSDD $24.96, $23.96/2+; DSDD $32.49, $30.96/2+. Double density available soft/10/16 sector (specify). 8" SSSD $24.96, $23.96/2+. Shipping $2/order. Add NJ sales tax if applicable. Write for other prices, info. Direct-to-Tape Recording Company, 14 Station, Haddon Heights, NJ 08035.

EPROM ERASER $49.95. Erases all UV Eproms, 90 day warranty, send orders to: LOGICAL DEVICES INC., 781 W. Oakland Blvd, Ft. Lauderdale, Florida 33311, (305) 776-5870.

ATARI—Superior Joystick conversion, grip trigger, paddle. GREAT! Easy! $4.00. Taylors, 1290 Ridgewood, Allison Park, PA 15101.

BASIC LINE PROCESSING. Move lines in basic. Also for error correcting. TRS-80 Model-I tape. State memory size $7.95 Hamlin Software, Dept. B, 6027 West Decker Rd, Ludington, MI 49431.

5" ELEPHANT DISKETTES. Prices per box of 10: SSSD $22.90, SSDD $25.90. DSDD, $39.90 (Specify Sectors) ship. $1.50/Box. TX Res. Add 5% tax. A&H Computing, P.O. Box 57134, Webster, TX 77598.

PRINTED CIRCUIT BOARDS quick. Also artwork supplies. Free Information. CIRCUIT WORKS, 1118 7th (CC) Neptune, NJ 07753.

SPECIAL SERVICES

PETER GIAMALIS — LEGAL SERVICES. 2501 Park Blvd., Palo Alto, California 94306, 415-324-0222, Attorney with Computer and Electronics background. Reasonable fees.

BUSINESS OPPORTUNITIES

ATTENTION MICRO AND MINI COMPUTER OWNERS. Inventive new method of monitoring investments with your computer, will allow you to set up your own office at home, and bring in greater income. Complete package $45. includes postage/handling. Write for information or send Check/Money order to: C.B.A.S., P.O. Box 163, Ontario, Ohio 44862.

"HOW TO MAKE MONEY WITH YOUR HOME COMPUTER." 2 Cassette package with booklet. Send $14.95 plus shipping to: COMPUTER RESOURCES, 1659 Mills Street, CHULA VISTA, California 92010.

LAZY Computer? Turn it into a moneymaker! Learn 100 ways to earn money with your computer. Book explains how to find customers — everything needed for success. $6.95 Californians add 6%. Edupub, 7030 Columbine Drive, Carlsbad, California 92008.

Computer Cash. 101 Exciting, new spare-time home business. $4.50. Research., Box 22485CR, Houston, TX 77227.

WANTED

FOREIGN LANGUAGE SOFTWARE WANTED. Oldest publisher of foreign language supplementary materials looking for software to stimulate classroom learning. Authors contact: Gessler Publishing, 900 Broadway, New York, N.Y. 10003, (212) 673-3113.

COMPUTER CLUB

GOLD COAST COMPUTER RENTAL CLUB — Apple/TRS-80 Software, Firmware, Hardware, Publications. For Free Brochure and details write: Route 1, Bremen, Kentucky, 42325, 502-754-5313.

COMPUTER SEMINAR

PERFORMANCE DESIGNS INC. Announces a series of seminars for executives in personal computing. For Dates and Locations, write: Performance Designs Inc., 1411 North Main Street, Box 124, Dept CC., Bluffton, Indiana 46714, (219) 824-5120.

FOR SALE/BARTER

BARTER! Will trade one or more new Xerox 820 Computer Systems with dual 8" disc drives (retail $3900 each) and/or one or more Xerox #4000 Telecopiers (retail $1695 each). We need three letter quality printers of 40CPS or better, also a Televideo CRT and keyboard, and/or a hard disc system to link with our Altos 8000 processor. Call if you have any of the above and are interested in Bartering, or buying! MARY LOMBARDI, 547 Mission Vineyard Road, San Juan Bautista, California 95045 (408) 623-4576.

GAMES

OIL WELL GAME: Find gushers to become rich. HIGH SCORE: UTILITY to save your scores. CATALOG: Utility to find disks by name and #. Send check or Money Order to: Steven Kahn 134-45 166th Pl., #3G, Jamaica, NY 11434.

TRS-80 GAMES—Big Five Cassette $12.95; Disk $14.95; SpacePak I & Adventure-Pak I, 2 games per Pak cassette $10.00. All games ppd. Write for FREE info. Software Research, 451 Lance Drive, Silver City, NM 88061.

DESIGN-A-DRUG. Chemistry game. New and Different! 48K Apple II+(3.3) or Atari 800 (1.0) diskettes. $16.95+$1.50 postage (check/M.O.). Only from KenEd, P.O.B. 855, Richmond, KY 40475.

IBM PC PRODUCTS

FREE PC INFORMATION, RGB Color Cables, Graphics Software and Booklet—"CHOOSING COLOR MONITORS." J.C. Strick & Associates, 949 S. Southlake Drive, Hollywood, Florida 33019.

TRS-80 COLOR COMPUTER PRODUCTS

HIGH QUALITY 16K SOFTWARE. Entertainment, Education, Business. Send SASE for FREE catalog. ILUME DESIGN, 4653 Jeanne-Mance St., Montreal, Quebec, Canada H2V 4J5. U.S. Inquiries.

COMPUTER PUBLICATIONS

MICROCOMPUTERS IN EDUCATION—the montly newsletter of educational software. $33.00 per year-c/o QUEUE, INC., 5 Chapel Hill Drive, Fairfield, CT 06430.

HOW TO MAKE MONEY WITH YOUR MICRO. Hard-back, 168 page guide shows how ... Money back guaranteed ... Send $14.95 to RH Publications, P.O. Box 105/C, Sullivan, Illinois, 61951. $1 for complete book list.

STRICTLY COMMODORE. Bi-monthly software-oriented publication entirely devoted to VIC-20, PET, CBM, and SuperPET. Each issue contains 4 to 6 full-length entertaining programs, product reviews, programming tips, and more. Subscription $15; sample $2. Strictly Commodore, 47 Coachwood Place N.W., Calgary, Alberta, Canada T3H 1E1.

COMPUCOLOR/INTECOLOR—Basic/Graphics Books and Disks. Write/call for Info. Charles Publishing, 130 Sherwood Drive, Dept CC, Hilton, N.Y. 14468. (716) 392-8152.

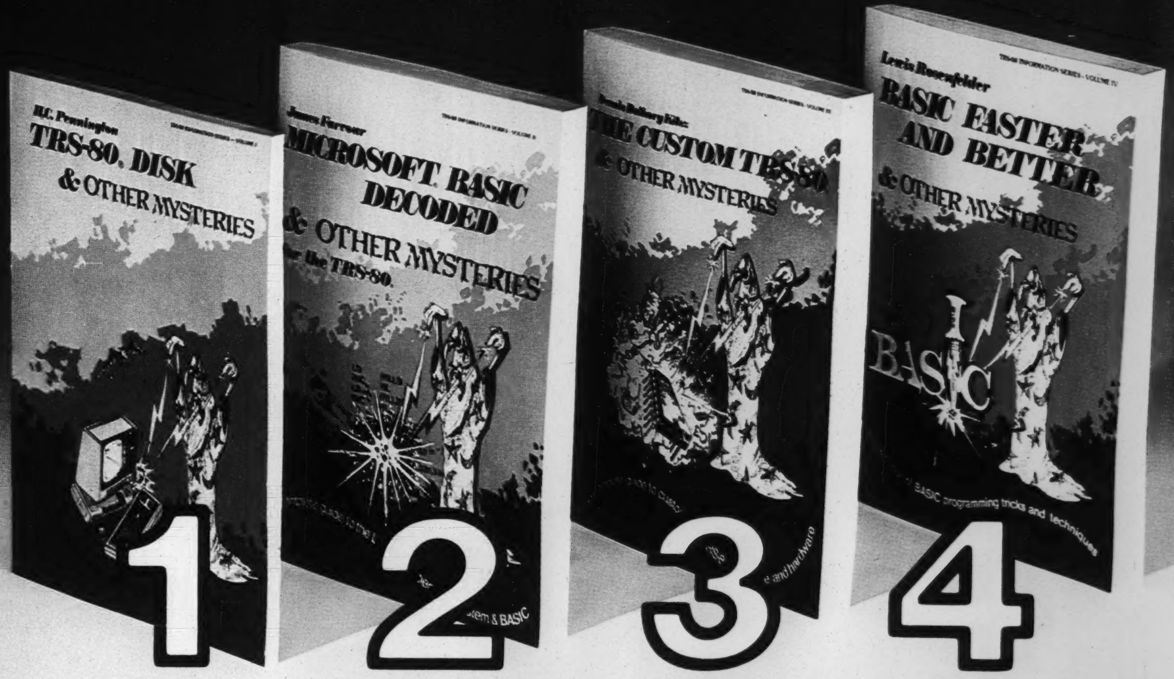
MISCELLANEOUS

WALKAROUND AM/FM PERSONAL RECEIVER w/headphones. Slim style with belt clip. Silver and black. Makes a great gift, only $99.95 postpaid. Full color catalog free with order of $3.00 (refundable) Send check, M.O., Visa, M.C., Am. Exp. Diners (exp. date, sign. number) to: CHM, Murdock Street, Shuqualak, MS 39361. Satisfaction Guaranteed.

• index to advertisers •

Reader Service No.	Advertiser	Page
101	Aardvark Technical Services	309
102	ABM Products	263
103	Adventure International	102
*	ALF Products	59
104	The Alien Group	273
105	Alpha Byte Computer Products	221
106	Alpine Software	205
107	Amdek Corporation	133
108	Amdek Corporation	66
109	Apparat	121
110	Apple Computer Corp.	74
111	Applied Software Technology	76
112	Archive	277
113	ARCsoft Publishers	237
*	Artworx	32
*	Aspen Software	239
114	AST Research	135
115	Atari	52-53
116	Automated Simulations	34
117	Automated Simulations	206
118	Avalon Hill Game Company	153
119	B.A.S.F.	149
120	BBI Mail Order	226
121	Beagle Brothers Micro Software	248
122	Big Five Software	2
123	Bit 3 Computer Corp.	134
124	The Bottom Line	235
125	B.P.I. Systems	42
126	Broderbund Software	72-73
127	Business Machine Consultants	293
129	California Accessory	203
130	Calsoft	171
131	Central Point Software	123
132	Charles Mann & Associates	188
133	Chrislin Data	69
134	Chromanetics Corporation	318
135	CJM Industries	298
136	Cload Magazine	261
137	Cload Magazine	261
138	Commodore Business Machines	86-87
139	Compuserve	95
140	Compushack	246-247
141	The Computer Book Club	200
142	The Computer Bus	116
143	Computer Discount of America	226
144	Computer-Ed	59
145	Computer Exchange	98-99
146	Computer Mail Order	117-119
316	Computer Outlets	315
147	Computer Plus	122
148	Computer Programs Unlimited	211
149	Computer Time Inc.	305
*	Computer's Voice	259
151	Computronics	231
152	Comstar	281
153	Connecticut Information Systems	223
154	Consumer Computers Mail Order	158
155	Corona Data	5
156	Cosmic Corp. Unlimited	19
157	Cottage Software	224
158	Covercraft	68
159	CPU Shop	271
*	Creative Software	191
161	Curtis Mfg.	295
162	Datamost	174
163	Datamost	31
164	Dickens Data	126
165	Discount Data Products	36-37
314	Discount Software House	229
166	D/Punch Co.	232
167	Dresselhaus Computer Products	122
168	Dynacomp	163-165
169	800 Software	227
170	Electronics Specialists	305
*	Financial Software	313
172	First Star Software	65
*	Fourth Dimension	263
174	Franklin Computer Corporation	106-107
175	Frederick Computer Products	303
176	Gebelli Software	143
177	Genie Computer Corp.	177
178	Gladstone	259
179	Gnosis	287
180	Gold Disk Software	248
181	Happy Hands	151
182	Hayden Software	92
183	Hayden Software	195
*	Heath Co.	136
184	Human Engineered Software	96
185	Huntington Computing	233
186	IBM	40-41
187	IJG Inc.	193
188	IJG Inc.	cover 3
*	Infocom	48-49
189	Inmac	229
190	Intec Peripherals Corp.	293
191	The Intelligent Investor	168
192	International Software Marketing	54
193	I/O Management	289
194	Jade Computer Products	139-141
195	JDR Microdevices	160
196	Kelly's Computing	115
197	Kybe	150
198	Last Electronics	236
199	Leading Edge	9
200	Leading Edge	cover 4
201	The Learning Company	105
202	LNW Research	13
203	LNW Research	147
204	Lyco Computer	301
*	Memotech	62
205	Metacomet	80
206	Meta Engineering	311
207	Meta Engineering	313
208	Micro Business World	167
209	Microcomputer Technology Inc.	267
210	Micro Control Systems	285
211	Micro D	15
212	Micro House	28-29
312	Micro Lab	89
214	Micro Lab	199
215	Micro Lab	39
216	Micro Learningware	259
217	Micro Management	225
218	Micromint, Inc.	229
219	Micro Motion	301
220	Micro Mountain	255
221	Microsoft	212
222	Microstatistics	101
223	Microsystems	307
315	Microware Distributing	319
224	Microworks	283
225	Miller Microcomputer Services	162
226	Mosaic Electronics	101
227	M-R Information Systems	264
228	Muse Software	236
267	NEBS Computer Forms	269
230	Neeco	77
231	Nexa Corporation	237
232	Newport Machine Design	101
*	NRI Schools/Electronics Division	81-83
233	Odesta	47
234	Omega Microware	108
235	Omega Microware	138
236	Omega Sales	257
337	Omni Resources	27
238	On-Line Systems	21
213	On-Line Systems	22
313	On-Line Systems	23
239	Optimized Systems Software	265
263	Orange Micro	243
240	Pacific Exchanges	226, 232, 259, 261, 264
241	Pan American Electronics	264
242	Peachtree Software	90-91
243	Peek & Poke Software	301
244	Penquin Software	173
245	Peripheral Unltd.	262
246	Perry Oil & Gas	287
247	Personal Computer Age	299
319	Piccadilly Software Inc.	216
248	Practical Peripherals Inc.	cov 2-1
249	Professional Software	253
250	Professional Software	251
252	Programmers Institute	295
251	Programmers Institute	297
253	Prometheus Products Inc.	215
254	Protecto Enterprizes	316
255	Psychological Systems	311
256	Quality Software	71
258	Radio Shack	111
259	Ranco Software Games	301
260	Reader's Digest	126
261	Realty Software	259
262	Red Baron	144-145
264	Redgate Publishing	57
265	Reston Publishing	187
266	R.H. Electronics	112
229	Rock Roy Inc.	180
268	Royal Software	279
269	Sandhu Machine Designs	76
270	Savey	128
271	S.B.J. Distributing	131
272	Scitor	80
273	Silicon Valley Systems	51
*	Sinclair Research Ltd.	60-61
274	Sirius Software	156
275	Sir-Tech	125
276	Sir-Tech	127
277	Soft Images	183
278	Software City, Inc.	269
279	Software Dimension	184
280	Software Galore	168
281	Software Hut	313
282	Softwareland, Inc.	274
283	Software Street	281
284	Southern California Research Group	317
285	Southwestern Data	169
286	Spectral Associates	314
*	Spinnaker Software	16-17
287	SRA	168
288	SRA	224
289	SRA	236
290	Standard & Poor's	45
291	Strategic Simulations	159
292	Street Electronics Corp.	305
293	Strictly Software	241
294	Sublogic	79
295	Sublogic	209
296	Success Sellers	176
297	Suntromics Co., Inc.	259
298	Synapse Software	189
299	Synetix	155
300	Systems Plus, Inc. of Maryland	293
301	Techcom Enterprises	297
302	Tecmar Inc.	7
303	Texas Instruments	190
304	TSK Electronics Corp.	196
305	Unicom	287
306	Valpar	25
307	Van Nostian Reinhold	303
308	Vector Enterprises	232
309	Videx	85
310	VR Data	289
318	Yucaipa Software	311

As Easy As...


H.C. Pennington
TRS-80. DISK & OTHER MYSTERIES
James Farvour
MICROSOFT BASIC DECODED & OTHER MYSTERIES for the TRS-80
THE CUSTOM TRS-80 & OTHER MYSTERIES
Lewis Rosenfelder
BASIC FASTER AND BETTER & OTHER MYSTERIES
BASIC
BASIC programming tricks and techniques
1
2
3
4

TRS-80 Disk & Other Mysteries

by H.C. Pennington

This book is the definitive authority on data recovery for the TRS-80 Model I disk system. In almost every case, lost data can be recovered and this book tells you how to do it. From clobbered directories to parity errors, this profusely illustrated data recovery cookbook includes examples and step-by-step instructions for both beginners and professionals.

132 pages. $22.50

Microsoft BASIC Decoded & Other Mysteries

by James Farvour

This book is the only one of its kind. You will learn how the TRS-80 Model I BASIC interpreter works from power-up to power-down. It has the complete disassembled Microsoft BASIC Level II interpreter with over 13,000 lines of detailed comments in one volume. The math, arithmetic and utility routines are fully explained with examples on how to use them. An incredible learning aid for the beginner and a valuable reference for the professional.

312 pages. $29.95

The Custom TRS-80 & Other Mysteries

by Dennis Bathory Kitsz.

A comlete hardware/software how-to-do-it like reverse video, high res graphics, audible keystrokes, 8-track mass storage music synthesizer, and real time clock. Dozens of project hints, tips, and fixes complete with the interface software. If you are a beginner, there are chapters on wire-wrap, soldering and construction methods. If you are a professional, there is a wealth of technical detail.

332 pages. $29.95

BASIC Faster and Better & Other Mysteries

by Lewis Rosenfelder

BASIC is not nearly as slow as you think! This book shows you how to make it faster and better with techniques and tricks that you never dreamed of for Model I, II and III disk systems. You won't find trivial, poorly designed "checkbook" programs here – only useful BASIC techniques and code ready for use in YOUR programs. Tutorial for the beginner, instructive for the advanced, and invaluable for the professional. All routines are available on disk.

290 pages. $29.95

Learn about your TRS-80 computer – it's as easy as 1–2–3–4. These books are easy to read and understand because they are written for you by people just like you. Here are answers and solutions without jargon. There are no end of chapter "tests" – no incomprehensible math formulas – no textbook explanations – just straightforward, plain English.

You will learn how to recover "lost data" on disk, how the BASIC interpreter works, how to make BASIC run faster and better, and how to modify and interface your TRS-80. In other words, you will learn how to make your computer do all the things you want it to do. It's as easy as 1–2–3–4.

Available at computer stores, B. Dalton Booksellers and independent book dealers. **BASIC Faster and Better** is also available at all RADIO SHACK Computer Centers and selected RADIO SHACK stores. (Cat. No. 62-1002) If your dealer is out of stock, order direct. Include $4.00 for shipping and handling. Foreign residents add $11.00 plus purchase price, in U.S. funds.

TRS-80 trademark TANDY Corp.

jG

1953 West
11th Street
Upland, CA
91786

CIRCLE 188 ON READER SERVICE CARD

REMEMBER:

ELEPHANT
MEMORY
SYSTEMS
"NEVER FORGETS."

MORE THAN JUST ANOTHER PRETTY FACE.

Says who? Says ANSI.

Specifically, subcommittee X3B8 of the American National Standards Institute (ANSI) says so. The fact is all Elephant™ floppies meet or exceed the specs required to meet or exceed all their standards.

But just who is "subcommittee X3B8" to issue such pronouncements?

They're a group of people representing a large, well-balanced cross section of disciplines—from academia, government agencies, and the computer industry. People from places like IBM, Hewlett-Packard, 3M, Lawrence Livermore Labs, The U.S. Department of Defense, Honeywell and The Association of Computer Programmers and Analysts. In short, it's a bunch of high-caliber nitpickers whose mission, it seems, in order to make better disks for consumers, is also to make life miserable for everyone in the disk-making business.

How? By gathering together periodically (often, one suspects, under the full moon) to concoct more and more rules to increase the quality of flexible disks. Their most recent rule book runs over 20 single-spaced pages—listing, and insisting upon—hundreds upon hundreds of standards a disk must meet in order to be blessed by ANSI. (And thereby be taken seriously by people who take disks seriously.)

In fact, if you'd like a copy of this formidable document, for free, just let us know and we'll send you one. Because once you know what it takes to make an Elephant for ANSI . . .

We think you'll want us to make some Elephants for you.

ELEPHANT.™ HEAVY DUTY DISKS.

For a free poster-size portrait of our powerful pachyderm, please write us.
Distributed Exclusively by **Leading Edge Products, Inc.**, 225 Turnpike Street, Canton, Massachusetts 02021
Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.

CIRCLE 200 ON READER SERVICE CARD